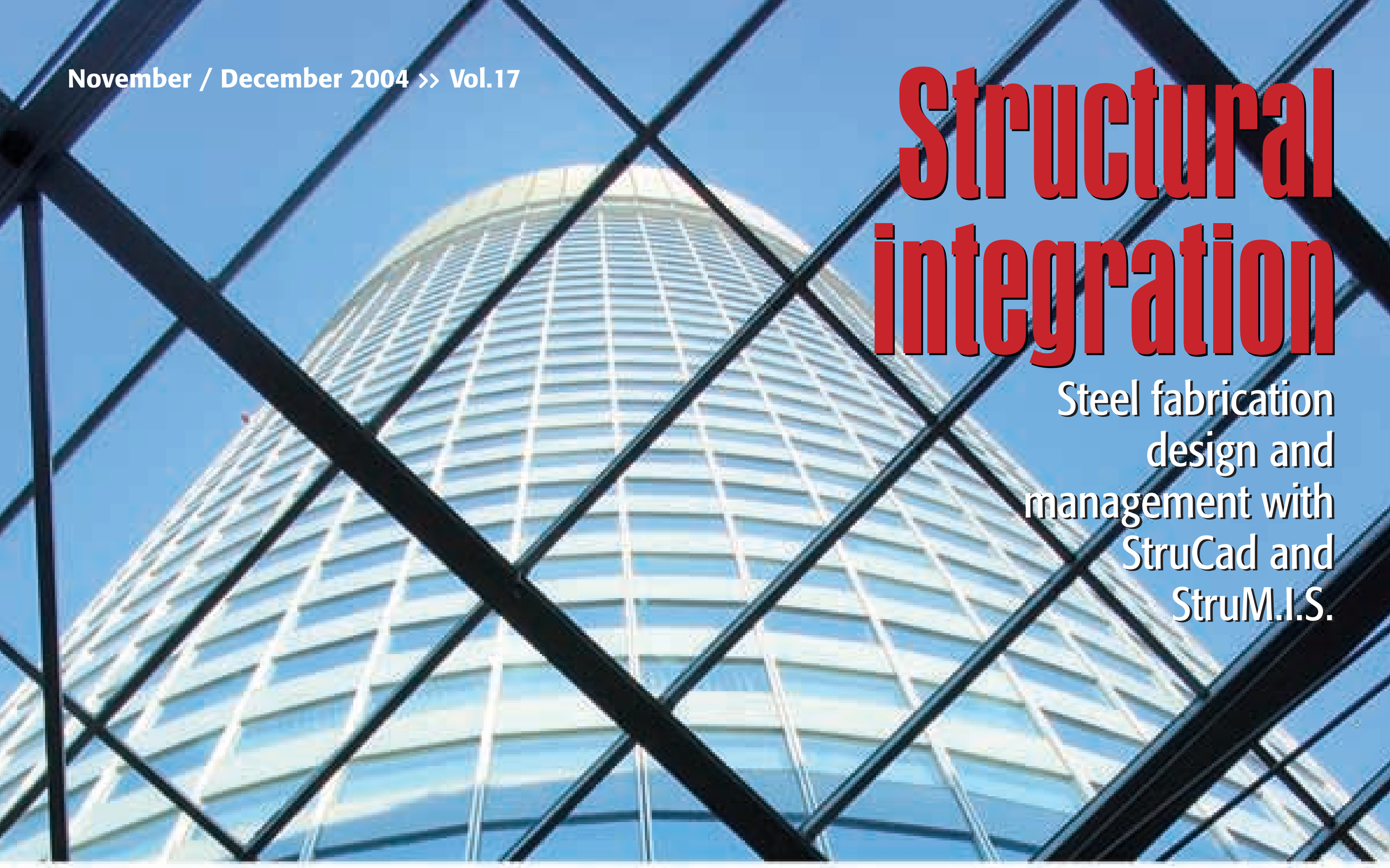
November / December 2004 >> Vol.17



Structural integration

Steel fabrication design and management with StruCad and StruM.I.S.

AEC MAGAZINE

DESIGN, MANAGEMENT & COLLABORATION IN THE BUILT ENVIRONMENT



Master and servant

OS Mastermap – the future of digital mapping?

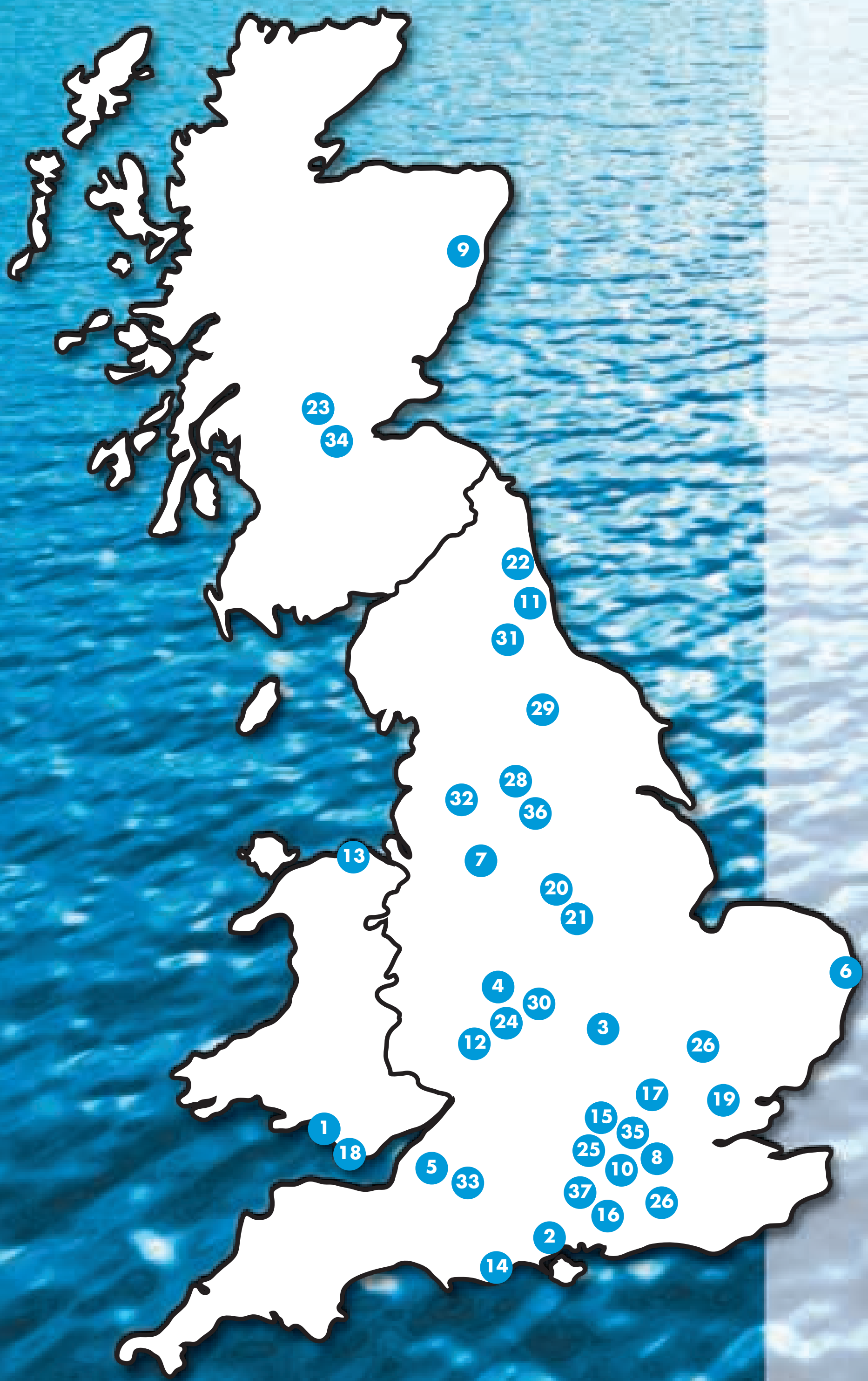
Acrobat 7.0

An added dimension for Adobe's PDF

Piranesi 4.0 – Non-photorealistic rendering for concepts and presentations

Upgrade by January 15th 2005

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AdSec

AdSec is an analysis program for sections under load. AdSec was originally developed for analysis of reinforced concrete sections but can now analyse concrete, steel or fibre reinforced polymer (FRP) sections, or sections composed of any combinations of these materials.

Analysis options are available for serviceability and ultimate limit states in accordance with British Standards BS8110, BS5400 and Eurocode 2 (EN 1992-1-1). Both uniaxial and biaxial conditions can be investigated

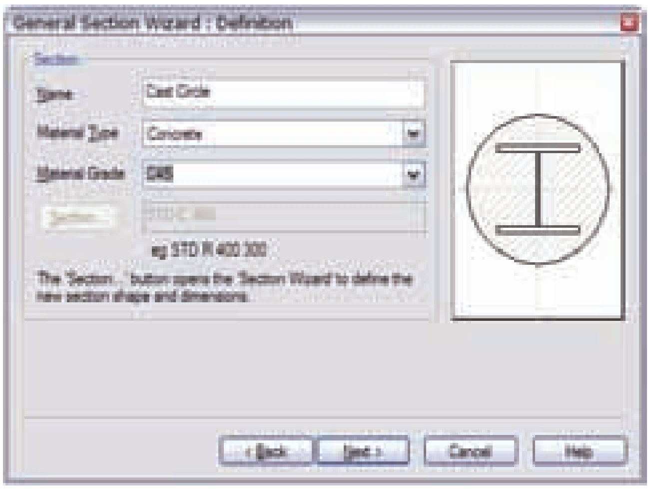


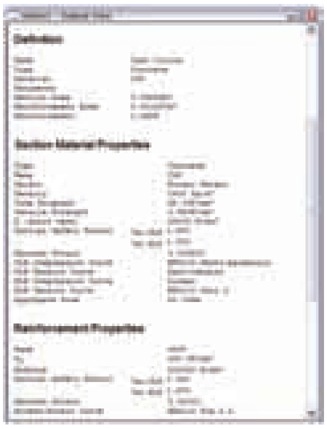
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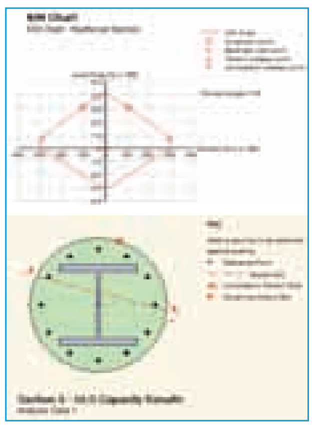
AdSec Version 7.3

AdSec is available in three versions:
Basic, Standard and Advanced.
Below are details of features available in each of the versions.

Features	Modules		
	Basic	Standard	Advanced
BS8110 (UK and Hong Kong, BS5400, Eurocode 2	✓	✓	✓
ULS Capacity Analysis	✓	✓	✓
Section Generation Wizards	✓	✓	✓
Concrete Sections and Steel Reinforcement	✓	✓	✓
Compound Sections and Tools		✓	✓
ULS Loads Analysis		✓	✓
SLS Loads Analysis		✓	✓
N/M Charts		✓	✓
Myy/Mzz		✓	✓
Moment Stiffness & Moment Curvature Charts		✓	✓
Steel Structural Sections			✓
FRP Sections and Reinforcement			✓







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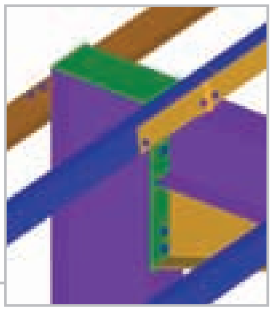
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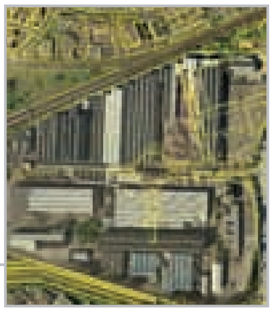
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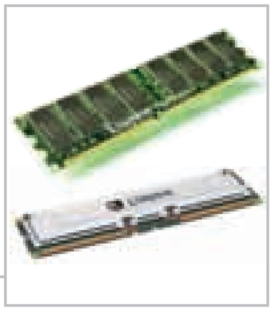
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E D A PUBLICATIONS









ISS offers free analysis software

Integrated Structural Software (ISS) is to provide much of is "Robot Millennium" structural analysis and design software free of charge in the future. Engineers may register for their "Robot Freeware" software via the company's Website.

Robot Freeware will not be a date limited license and does not require any commitment from the user at any time towards ISS. According to its developers, Robot Freeware will provide a solution for the engineer to carry out the vast majority of their everyday analysis work.

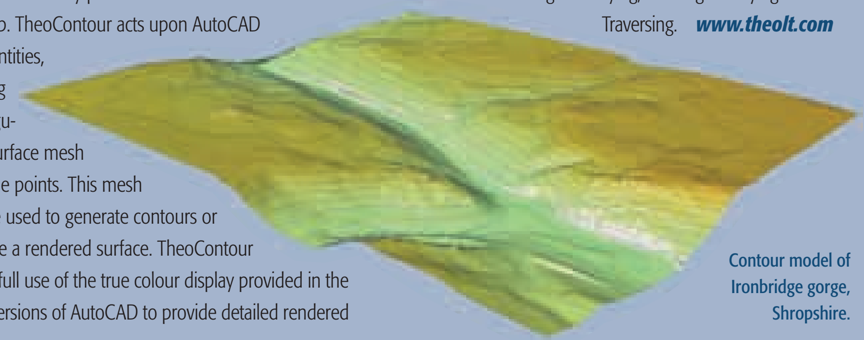
Key features of Robot Freeware include: 2D frame, truss and grillage analysis of up to 3,000 nodes and 3D frame and truss analysis of up to 3,000 nodes; Section libraries and section property calculator for any arbitrary section shape; Parameterised library structures (trusses, frames etc); FE plate and shell analysis with auto meshing - up to 50 finite elements; and Linear analysis and 1st mode dynamic analysis.

"We are pleased to offer this free solution to engineers and we know that they will make great practical use of this powerful application, said Gary Wyatt, Director of ISS. "When we were formulating our plans for Robot Freeware it was our goal to produce something highly relevant to the engineers work, not just a gimmick, a demo or short term evaluation or money refunded if not satisfied offer, but rather a real powerful piece of software for real projects and that is what we have delivered with Robot Freeware. Naturally our hope is that satisfied users will then wish to explore additional aspects of Robot not covered by the freeware, such as advanced FE analysis, cables, Pdelta, non linear and dynamic analysis - the upgrade to the full version will be available to freeware users with an attractive pricing policy." ***www.issrobot.com***

LatimerCAD enhances contour and DTM tool

Latimer-CAD has announced the second release of TheoContour, a cost effective AutoCAD-based contour and DTM generation solution. TheoContour is aimed at users who have either an occasional need to work with survey data or have no need for the full groundwork analysis offered by products such as Autodesk Land Desktop. TheoContour acts upon AutoCAD point entities, building a triangulated surface mesh from the points. This mesh may be used to generate contours or produce a rendered surface. TheoContour makes full use of the true colour display provided in the latest versions of AutoCAD to provide detailed rendered surfaces coloured according to height or gradient. The primary tools are: Contouring - Surfacing, Sections and Profiles. Prices for TheoContour start at £295.

TheoContour is part of the TheoLt range. Additional modules cover Basic Surveying, Building Surveying and Traversing. Surveying, Building Surveying and Traversing. ***www.theolt.com***



Contour model of Ironbridge gorge, Shropshire.

CSC BIM seminars reach over 180 engineers

CSC has recently completed a series of seminars around the UK, describing the benefits of BIM - Building Information Modelling - to more than 180 engineers. Sponsored by Buro Happold the seminars demonstrated in real time the benefits of working with 3D+, a CAD System for Structural Engineers. The seminar was based on an actual project for the design of a primary school in Ealing, London.

Integration between the Engineer and the Technician was shown in real time, demonstrating the benefits that can be achieved by sharing data and the methods of managing the process effectively. The structure was set out fully in 3D+ and passed to Fastrak Building Designer where structural design was carried out, and passed back to 3D+ to update the drawings. Full revision history with clouding of drawings was demonstrated.

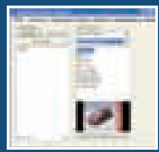
Integration with external members of the project team such as the architect, M & E Engineer, and the steel fabricator was also shown in real time. Passing structural objects into other discipline models enabled the project to be fully coordinated, resolving problems well before the project reached site. Using the model data obtained from all disciplines full visualization and walk through were demonstrated with NavisWorks, to conclude the seminar which was designed to show full integration with real project data, in real time, for the structural engineer. ***www.cscworld.com***

2D constraints in TurboCAD



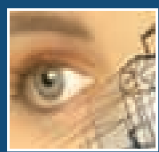
IMSI has announced the latest version of TurboCAD Professional version 10.5. This new version incorporates D-Cubed's 2D Constraint Manager, for geometric constraint solving in 2D sketches, and also several additional new and improved drafting and design tools. ***www.imsisoft.com***

Project management for RPC



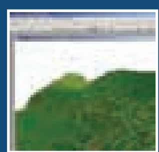
ArchVision has announced the availability of the ArchVision Content Manager (ACM). The ACM is a project management tool that makes it simple to organise RPCs (Rich Photorealistic Content) to complete rendering tasks more efficiently. The ACM includes features like free content downloads, digital rights management, centralised content and path management, project -based organization tools and more. Max, Viz & ADT Plug-ins are being offered to customers free of charge via download. ***www.archvision.com***

Server-based viewing



Rasterex Software has released RxViewServer, a server-based solution for the sharing of documents and drawings over the Web – with no software installed on the client machines. RxViewServer allows users to view, print, markup and collaborate on more than 250 different file formats (CAD drawings, plot-files, PDF files, Office Documents raster images etc.) directly within their browser – via intranet, extranet, Internet, web portals or content management systems. ***http://viewserver.rasterex.com***

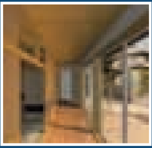
Critical link analysis



Wallingford Software, a developer of hydraulic modelling and network data management software for the worldwide water industry has revealed plans to release a new tool, Critical Link Analysis, that will feature in the next release of InfoWorks. This additional tool, used to identify critical network links, has been developed in response to the requests of modellers worldwide and is planned for launch towards the end of the autumn. ***www.wallingfordsoftware.com***

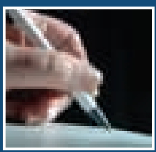
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Graphisoft extends IFC



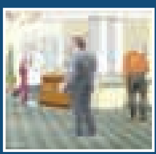
With a view to boosting its support for Industry Foundation Classes (IFC) and interoperability in the AEC market, Graphisoft has teamed up with EPM Technology and announced the adoption of EPM's Express Data Manager technology. This new Express Data Manager communication platform is designed to boost IFC execution times, and streamline workflow between design and contractor. Furthermore, it has the potential to reduce critical data transfer bottlenecks on large projects through a central storage point which allows data filtering to send only relevant building data to the third party. **www.graphisoft.com**

A CAD manager's role?



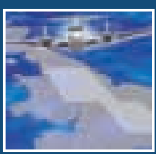
A report highlighting the responses to Cadconsultancy's recent CAD Managers Survey in the UK is available for free download. The UK AEC CAD Managers survey was carried out by Cadconsultancy to obtain an overall view of the role of a CAD Manager within the UK. ***www.cadconsultancy.co.uk/downloads/Cadconsultancy-CADManagersSurveyResults.pdf***

Non-photorealistic content



ArchVision has announced the availability of NPR (Non Photorealistic Rendering) People Volume 1 and NPR Trees & Plants Volume 1. The two new collections, consisting of hand rendered and masked entourage, were created by Entourage Arts, a Canadian-based firm specialising in content for architectural illustration. ***www.archvision.com***

Terrain mapping across UK



Intermap Technologies has announced a new flying programme beginning in the spring of 2005 that will extend its NextMap Britain 3D landscape map across the whole of the UK. With a specially equipped Learjet flying at night at an altitude of up to 28,000 ft., NextMap Britain data is captured every five metres with sub-metre vertical accuracy. The NextMap datasets include terrain and first surface models, a radar image and contours ***www.intermap.com***

More news stories, updated daily, at:
www.cadserver.co.uk

DWF meets PDF at Bluebeam

Autodesk is working with Bluebeam Software to provide additional file sharing options to designers and engineers that use AutoCAD software. Bluebeam, better known for its tools that create PDF files, will work with Autodesk to develop solutions that enable AutoCAD users to more easily convert complicated, large-format AutoCAD drawings into lightweight Autodesk DWF (Design Web Format) digital files that can be easily e-mailed to clients.

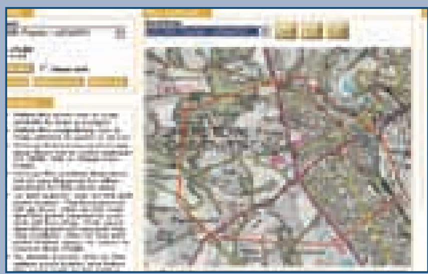
Bluebeam will be enhancing its current solution, Bluebeam Pushbutton Plus, so that Bluebeam Pushbutton Plus users have the option to convert any file to the DWF file format.

"Bluebeam's Pushbutton Plus solution currently gives users the ability to convert their drawings and documents to seven different formats - it makes sense for us to also include the DWF format," says Richard Lee, President and CEO of Bluebeam Software. Bluebeam's partnership with Autodesk allows our company to provide users with solutions to further accelerate the design and production processes. In addition to allowing users to output to the DWF format, Bluebeam will also be working with AutoCAD to create specialised technology that will enable AutoCAD users to convert large quantities of digital drawings to the DWF format in a single batch. This new tool will save AutoCAD users considerable time and energy converting large sets of CAD drawings to DWF."

Bluebeam plans to launch a product that includes DWF capability in the first quarter of 2005.

www.bluebeam.com

eMapSite enhances on-demand mapping site



UK online digital mapping service, eMapSite, has launched a new improved website www.emapsite.com to meet its customer's wide-ranging mapping requirements in the AEC sector. Users can now register online, search on location, browse a wide selection of geo-data for GB, select their project area on screen, choose the appropriate data and output format and order online for instant delivery.

Daniel Slater, Head of UK Sales and business Development, explains, "We have worked really hard over the last six months developing the new website so we can deliver a complete end-to-end service to our clients that provides a one-stop-shop for UK geo-data, efficient management of this in a searchable data library and a host of other useful and associated services."

Having established strategic partnerships with the UK's leading mapping suppliers, eMapSite a platinum partner of Ordnance Survey claims to offer the most comprehensive range of mapping and geographic data products available.

This includes the complete range of OS mapping, as well as the most detailed terrain and height data and aerial photography at different resolutions that is typically required by project teams. "We are also well placed to source specific and unusual mapping requests and can develop bespoke and valued-added data sets to client specification," adds Slater. ***www.emapsite.com***

Graphtec enhances wide format scanners



Graphtec (GB) has launched the CS Series of scanners, a new range that utilises CIS (Contact Image Sensor Method) technology, which is designed to give reproductions closer to the original, however detailed or colourful an image.

The CS Series comprises the fully sRGB compatible, 24-bit CS600 and CS500 for full colour images and an 8-bit IS200 for monochrome work, with each having standard and professional versions.

All models have 600dpi true optical resolution and interpolated resolutions between 50 and 800dpi available in 1dpi increments on standard models, with professional versions supporting the highest output resolutions in the market at 4,800dpi. Together, the new range provides high precision scanning solutions of full colour and monochrome images for a diversity of applications encompassing repro bureau, in-house repro and copy shops, mapping, high resolution CAD/GIS, architectural and engineering requirements. High speed scanning of A0 size full colour images takes only 33 seconds at 400dpi and A0 size monochrome scanning a mere 13 seconds. ***www.graphtecgb.com***

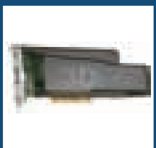


Introducing Autodesk Civil 3D 2005.

Autodesk® Civil 3D™ is the civil design software that helps you make changes in a flash. Now you can create intelligent civil engineering models that link all of your objects. So, move a road alignment and your grading, cross sections, and profiles dynamically update. Learn how you can achieve major design and drafting productivity gains with the proven technology of Autodesk Civil 3D. Visit us at: **www.autodesk.co.uk/civil3d**

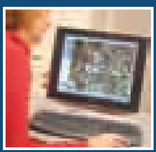
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3Dlabs slashes AGP prices



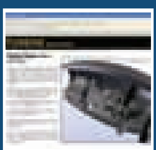
3Dlabs has slashed the price of its new generation AGP graphics cards, the Wildcat Realizm 100 and 200. The Wildcat Realizm 100 now ships for £377, a saving of 37%, while the Wildcat Realizm 200, now ships for a £549. Both cards have performed impressively under industry benchmarks and we would expect the cards to appeal to those looking to boost the 3D performance of their workstation. ***www.3dlabs.com***

Aerial photography tool



BlueSky has launched a free software tool for viewing aerial photography and easy map making. The BlueSky 'Vista' package is for use with aerial photo-maps that cover all of England, Wales and lowland Scotland, and enables users to display, zoom, pan and print aerial photo-maps. The aerial maps can be overlain by other digital layers such as symbols, lines, street maps and names, allowing maps to be created and printed. Vista also provides useful geographic analysis features such as distance and area calculations. ***www.bluesky-world.com***

Adobe adds 3D to PDF



Adobe has introduced Acrobat Version 7.0, which includes support for the Universal 3D (U3D) format, developed by Intel and the 3D Industry Forum. Adobe's support for U3D will allow users of Acrobat 7.0 Professional to place U3D objects - such as CAD models - inside PDF files. For a preview of the new release turn to page 19. ***www.adobe.com***

Dual card rendering



ART VPS has announced support for running two of its Pure PCI cards in a single machine, delivering a new level of ray-tracing performance on the desktop, the company claims. Dual Pure support provides access to 16 AR350 ray-tracing processors within a workstation, providing power previously available only through ART VPS's RenderDrive system or renderfarms using multiple computers over a network. ***www.artvps.com***

More news stories, updated daily, at:
www.cadserver.co.uk

New HP DesignJet doubles up



Aiming to consolidate its position at the top of the large format inkjet sector, HP has unveiled the latest addition to its highly successful printer series, the Designjet 4000.

The HP Designjet 4000 printer series has been designed to meet the needs of the architecture, engineering, construction, MCAD and GIS markets, which require accurate lines, professional image quality and fast unattended printing.

New technology within the writing system allows the printer to double the print speeds of both colour and monochrome documents, when compared with current HP large format printers HP Designjet 600/700/800/1000). Quoting its fastest mechanical print speed, HP claims the DesignJet 4000 can output an A1 drawing in 25 seconds and complete a print job of 100 A1 formats within one hour using its multi-copy printing facility.

One of the most notable advancements is the introduction of HP's 'Double Swath' technology, which doubles the number of printhead nozzles by placing them in a staggered formation.

HP has also concentrated on print quality, with the DesignJet 4000 providing high resolutions up to 2,400 dpi and up to +/- 0.1 percent line accuracy. This makes it perfect for users who need precise designs, plans and line drawings, the company claims.

The Designjet 4000 Printer series also provides lower running cost and easy remote print management capabilities, says HP. A faster processing speed is designed to significantly improve performance and eliminate waiting time for the print job to be completed. Other related features include remote job preview and printer status and alerts, which gives information on supplies levels and allows for unattended printing.

The HP Designjet 4000 Printer series will be available in the UK from February 1, 2004. ***www.hp.com***

Vegetation simulation tool for ADT and VIZ

EASYnat, a plant generator for the AEC industry from Bionatics, is now fully integrated into Architectural Desktop 2005 (ADT) and Autodesk VIZ 2005. This means architects will now find it easier to model botanically accurate vegetation in 2D or 3D using ADT and visualise it using VIZ Render. EASYnat also simulates the growth of plants and their seasonal changes.

The latest version offers significantly enhanced data exchange making it very simple to interchange plant models between ADT and VIZ. Also, thanks to texture sharing capabilities, forest can be quickly generated without a heavy burden on the memory.

"The use of vegetation has become a basic criteria of architectural design," says Pelle Chiari, business manager, Autodesk Building Solutions Division. "With EASYnat fully integrated, ADT now offers architects and building professionals a simple solution to modelling exterior environments for their projects and enabling them to meet increasingly demanding market requirements."

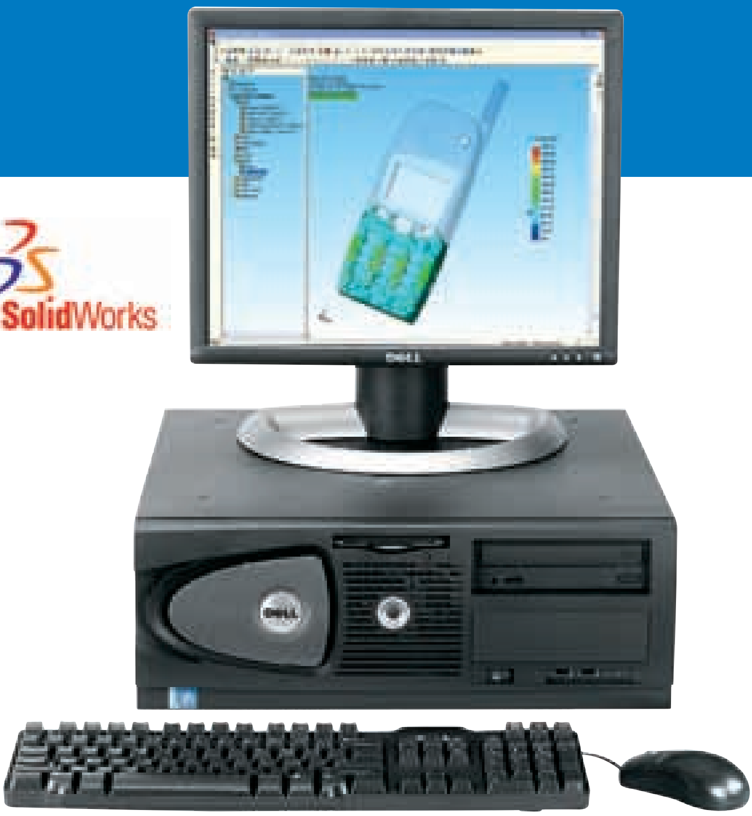
EASYnat can automatically model a plant in 3D or 2D thanks to a hybrid technique that combines the two. The solution enables the user to generate a 3D plant with minimal polygons and maximum realism.

ADT has a built-in base library of four species and these can then be augmented with trees and plants from the Bionatics' website. These can be placed on a plan in 2D vectorial form, but then can be instantly expanded to a 3D realistic view. ***www.bionatics.com***

Repropoint launches new map service

Woking-based digital print solutions provider Repropoint has launched a new service which makes available for the first time by e mail, post or as a download from a PC, the complete range of Ordnance Survey large scale maps and data. Repropoint has teamed up with the National Map Centre and is now able to provide the full range of Ordnance Survey's Options mapping portfolio which includes Siteplan maps and Siteplan data for inserting into reports; Superplan DXF for use in CAD for construction or development, and Landplan for land management.

The new service includes the introduction of a Desk Mapping system which means that high volume customers could be given their own access password and can link straight into the Ordnance Survey's database enabling them to download maps and data direct. Alternatively maps can be delivered by email, post, or can be collected from Repropoint's digital map centres at their branches at Woking, Guildford, Portsmouth and Southampton. ***www.plans-direct.com***





AutoCAD 2000i Retirement

While Autodesk's development strategy is coming along nicely, the rate at which the company 'retires' products is increasing, shortening the length of time between upgrades. Martyn Day reports.

Martyn Day

It's getting close to that time of year again; children are writing their wish lists, men dress up in red outfits with big white beards, presents are wrapped and it's all 'peace on earth, goodwill to all men'. However, Christmas is also a time to reflect on those less fortunate than yourself, and spare a thought for the turkey that will meet its maker, the unwanted Christmas puppy and the die-hard user of AutoCAD 2000i.

The cut off date to upgrade AutoCAD 2000i is January 15th 2005. Users failing to upgrade by that date will not be eligible for the usual upgrade pricing and will have to pay for a new copy should they want to move to a new version. These 'obits' as they were called, are now termed 'retirements' and Autodesk has long held the policy of 'retiring' the third previous release of AutoCAD – meaning that the product can no longer be upgraded, supported or new copies of that version bought. Autodesk is keen to point out that it does not force customers to upgrade, although I think 'coerce' is certainly a word applicable here.

In the past, Autodesk has taken considerable periods of time to develop and release each major 'R' of AutoCAD, meaning that some releases could be the current release for 18 – 24 months. With this development cycle, users could stay on the same release of AutoCAD for as long as five, perhaps six years, before having their version of AutoCAD 'retired' and having to upgrade. Over the past two years, Autodesk has made some big changes to the way it develops, leading to yearly releases of all products, around the March timeframe.

A move from 18-24 month to 12 month release cycles means that Autodesk produces a new version each year (a major 'R') and therefore the company retires a release each year, shortening the life of each release, compressing the customer's upgrade cycle. Customers that used to be able to stay on a single release for up to five years will now have to upgrade every three.

Traditionally, a majority of AutoCAD users have upgraded every other release. For instance, Release 2000i, which is being retired in January, was not a popular Release of AutoCAD, while the subsequent 'R' (AutoCAD 2002, which looks like it will now be scheduled for retirement January 2006), was a hit and still has considerable numbers of users. Taking the old timescale of Autodesk development for two versions of AutoCAD, this 'every other Release' was around 3-4 years. So the new compressed retirement deadline is probably less of a problem for this type of upgrader. However, there are many projects with timescales longer than three years and some users may feel angry that they are asked to upgrade not on their own timescale's, but Autodesk's. Indeed, an Autodesk survey of its customers a few years back indicated that up to 60% of Autodesk customers felt that Autodesk didn't care about its customer's businesses. I'd figure that this upgrade policy contributed heavily to this response.

> Autodesk is keen to point out it doesn't force customers to upgrade, although I think 'coerce' is certainly a word applicable

To be fair, when Autodesk moved to a yearly release (around 2002), the number of features developed and delivered dropped and so the cost of upgrading a seat of AutoCAD was almost halved. The features that are now being added are actually very useful and well thought-out. At the same time Autodesk started its Subscription offering, which has gone through a number of configurations on deliverables and timing but now offers on-line web support, e-learning and includes at least the next release of AutoCAD. It's now also possible to pretty much put all Autodesk products on Subscription, with only a few caveats. A recent change to subscription policy, also allows users to run older versions of AutoCAD within their product mix.

Autodesk has altered its upgrade pricing, making subscription the best value way to upgrade when compared to upgrading every year, upgrading every other year or upgrading every third year. In short, if your company is committed to using AutoCAD, in the long or short term, Subscription offers savings. It's also the only way to ensure gaining access to old versions of AutoCAD should they be required. There is the issue though, that Subscription can only be taken out on upgrading (pay for the upgrade to the current release, then pay a subscription fee too, which will give you the next release, plus all the services).

Conclusion

While some customers will undoubtedly be unhappy at the seemingly accelerated retirement schedule for previous versions of AutoCAD, there's not a lot than can be done about it, it's a part of Autodesk's global business model but there are still some options. Autodesk runs a little marketed program for customers with non-supported versions of AutoCAD, giving them a discount of up to 30% off the full price of a new copy (to which the dealer may add additional discount).

Looking at the revised upgrade costs, subscription, it's a 'no-brainer' compared to upgrading either every year, every other year, or even less frequently. Then, when you add in the web support and e-learning, subscription and the capability of running other versions of AutoCAD, subscription is even better value. Even though Subscription provides the next release, it still gives customers the ability to legally use the version of AutoCAD that they wish. New product can be shelved for a later date. While this is a benefit, Autodesk should be aware that this doesn't really get customers feeling warm and fuzzy about them – having to buy product they don't want yet.

I guess the alternative is to keep using the AutoCAD you have, until the upgrade price of full AutoCAD exceeds that of a new copy of LT. AutoCAD LT, however, has gained a nasty habit of increasing in price. Or run a dual CAD vendor strategy and deploy some seats of a competitive product- if we could change CAD system as easily as we can web browser, I think the pricing models would be a lot more flexible.

Structural integration

AceCad has been at the forefront of steel fabrication software development for many years with StruCad, and since its purchase of Leeds-based GoData four years ago, has been looking to bring the industry's design and management processes closer together.

Greg Corke

Product: StruCad Version11 / StruM.I.S 5.2 **Supplier:** AceCad **Price:** On application

In the structural software market, particularly for those involved in steel fabrication, 3D is a necessity, and has been for a number of years. Here the modelling process is geared around creating a complete 3D steelwork model, down to the last I-beam, purlin, notch, weld, bolt and plate. It's an established process and the benefits are manifold, but with an increasingly mature market, where does the steel fabrication software industry go next?

Data management

Usability enhancements, processing power, and user aptitude can go a long way to enhancing the speed of the modelling process, but there is a limit to how much better, or how much faster, users can model steelwork. Where additional benefits can come from is being able to re-use information derived during this modelling process. We're not talking about the automatic derivation of 2D drawings, cutting lists, and CAM data to drive CNC machines here, as these are already mainstay benefits of 3D steel fabrication systems. What we are referring to is providing tighter links with other steel fabrication business processes such as project timings, budgets and planning. It's all about giving the fabricator access to data in respect of the model he's already created.

This is the strategy AceCad Software, the developer of industry-renowned steel fabrication modelling tool, StruCad, has adopted over the past few years, a move supported by its purchase of Leeds-based GoData Limited in the year 2000. AceCad has spent the last few years transforming GoData's DOS-based steel fabrication management into StruM.I.S, its own Windows-based Estimating and Complete Management Information System (MIS). StruM.I.S provides management access to all the information produced at every stage of a steelwork contract from tendering, through procurement to manufacturing.

AceCad has co-ordinated the development of its 'modelling' (StruCad) and 'management' (StruM.I.S) systems so that the two can share data to help maximise efficiency and accuracy in a steel fabricator's business. The StruCad model can provide information with which to populate StruM.I.S reports including estimates, purchase orders and fabrication batches.

A snapshot example would be a StruM.I.S module called PAS, which automatically routes steelwork through the fabrication shop. Traditionally a 20-ton lot of steel drawings would take somebody a day to organise – which members need cutting, drilling, where they need to go etc. From StruCad it creates a file that goes into one element of StruM.I.S and all the automatic routes, definitions and routines are pre-defined so you can send the steel through an electronic chase and produce a report of how long it took.

In addition, StruM.I.S can also feed information back into StruCad to provide a graphical illustration of the progression of a contract, or provide the detailer with live feedback, such as real-time costings – the financial implications of moving beams within a construction, for example.

Design integration

While AceCad has identified 'management' and integration with the 3D model as one of the biggest growth areas in the steel fabrication market, it has not ignored the huge potential for the re-use of 3D data as part of the design and analysis process. For years, StruCad has been able to import steel data from all the major structural analysis programs, or dumb geometry from CAD software such as AutoCAD.

However, the company has also developed a number of its own software tools that make use of data derived from StruCad, or interact with the program itself. Analysis, fabrication and design are all catered for, and here are some of the tools that are available that make maximum use of data throughout the steel design/fabrication process.

Metport: A couple of years ago, AceCad co-developed a program with Metsec, the largest cold rolled manufacturer in Europe. Metport is able to automatically design Metsec Purlins and Rails within an elastic-plastic portal frame analysis. Traditionally, companies would have to use two separate programs: one for the hot rolled frame, and one for the Metsec components, and interpret the data between the two.

Metport automatically calculates wind and snow loads to BS 6399 and enables designers to arrange the purlins to obtain the best hot rolled design. Once all stability and deflection checks are passed the design can be brought into StruCad automatically detailing members and connections. It's a simple program to use and because it uses a StruCad model it can automatically create all the 2D details and CAM data.

StruCad Version 11 highlights

Limits – no limits on number of members, joints, fittings, user attribute values and bolt groups.

CAD GUI – includes standard windows toolbars, which are dockable and incorporate drop down menus for current layer selection and drop-down buttons. Toolbars can also be customised and a four port view now allows port re-sizing by mouse dragging.

XREF – ability to XREF external drawings into both 2D and 3D, currently supporting SPF and DXF formats.

Multi User – the automated synchronisation of the work of multiple users. (V11/Summer 2005)

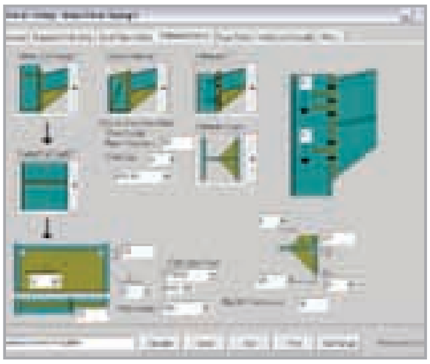
Detail Views – for the detail command and assembly drawings, detail views will be enhanced with the addition of part information such as stock size, mark, grade etc.

Nested Drawings – a new nesting system will allow the nesting of multiple drawings onto single sheets and will be fully integrated into the marking system.

StruConnect – moment connection design will be introduced to V11, and will also be available as a standalone connection design program.

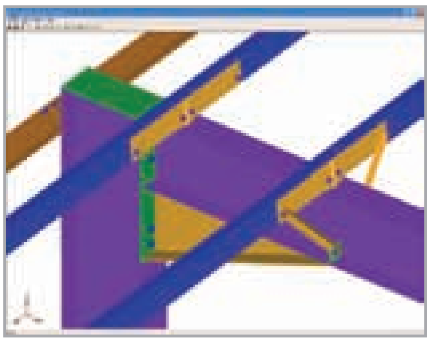
CIS/2 (CimSteel 2) – analysis and fabrication import and export

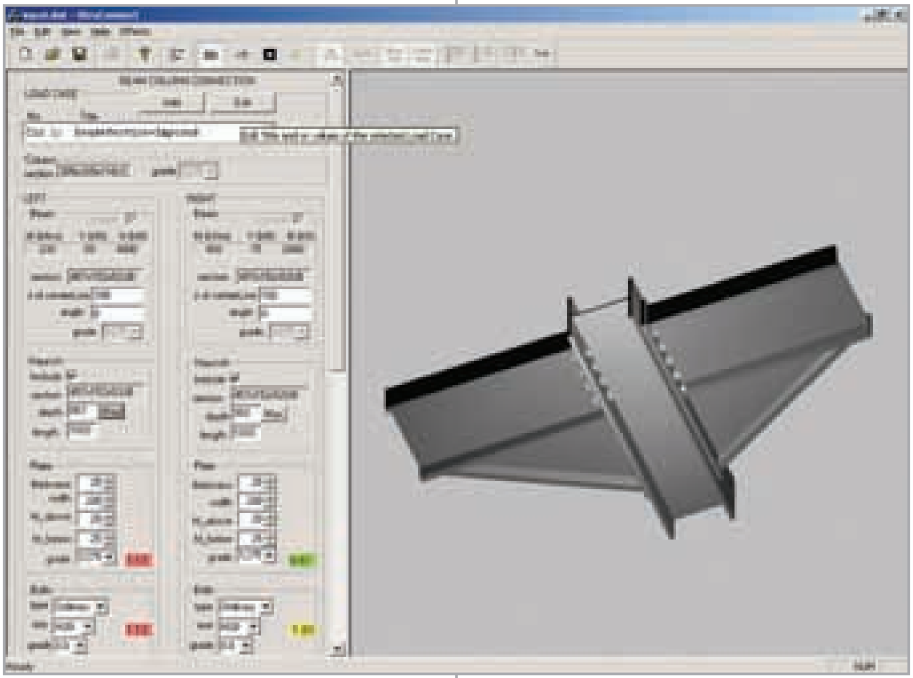
New Staad link – new improved Staad link.



Using StruCad's extensive collection of parametric macros, users can carry out standard connection details via easy-to-use dialogue boxes.

StruWalker is a free downloadable tool that enables anyone to walk through a StruCad model, interrogate and check it.





With StruConnect, an engineer can design complex connections, which can then be emailed and inserted directly into the master StruCad model.

StruNest: Using a plate cutting CAM file generated from within StruCad, the StruNest plate nesting system allows users to optimise their steel stock by planning cutting schedules to calculate minimum wastage. StruNest can also be installed as a stand-alone product, users can import or export DXF files, and also perform nesting manually.

StruConnect: This is one of the most exciting new developments from AceCad, and I mean new as it won't be available until next year when StruCad Version 11 is released. StruConnect is described as 'a true' connection design program which, in addition to being made available to all StruCad customers on maintenance, will also be sold as a standalone product to engineers for a few hundred pounds – and this is where it gets interesting.

The idea behind StruConnect is that when a design for a complex joint arises the engineer can design the joint in StruConnect and then email the file to the fabricator who can insert the joint directly into the Master StruCad model. Traditionally, an engineer would design the joint using a dedicated joint design program or with a pencil and paper, then communicate the design to the detailer by the best means possible. By giving the engineer the ability to pass on the 'exact' data to the detailer with StruConnect, AceCad is not only aiming to reduce the time taken but also cut out the potential for errors in interpretation and eliminate some loops of what is often quite an iterative process.

StruWalker: While drawing output continues to play a major role in the steel fabrication sector, AceCad has attempted to bring the checking process upstream with a free downloadable and re-distributable 3D viewing tool. StruWalker enables anyone to walk through a StruCad model, interrogate and check it. The latest version also includes the SPF drawing viewer system so an engineer can take a rendered model, click on it to measure a distance, and then pull up the relevant fabrication drawings and CAM data. Potential problems can then be flagged up on the drawings and returned to the detailer for rework.

As all structural and dimensional data is derived from this same model, many engineers across the UK are already using StruWalker as their primary tool for checking designs.

Conclusion

In the construction industry as whole, the steel fabrication sector has been one of the pioneers of 3D modeling practices. While the derivation of 2D drawings from a 3D master model is still seen as cutting edge technology for many architects, it's been the bread and butter for steel fabricators for many years, as has the automatic production of CAM files to fabricate steel via CNC machinery.

While these established processes revolve around the re-use of data in the production of engineering data, AceCad has identified the huge benefits that can be gained by integrating the design and management processes. Giving the fabricator access to data in respect to the model he's already created not only has the potential to cut time and errors, but help steel fabricators manage their businesses more effectively. For example, StruCad and StruM.I.S customers can not only model, list and cost every piece of steel, but track it through tendering, procurement and manufacturing, and even monitor its progress on site using radio frequency bar-coding!

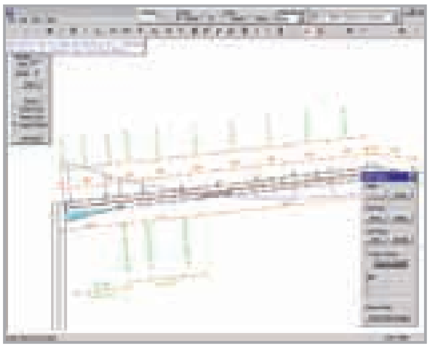
While there has been a definite shift in direction for AceCad over the last few years, it's good to see the company hasn't forgotten about its design products. StruCad's long overdue facelift in Version 11 will be welcomed by many and should make the product a lot more welcoming to first time users. Furthermore the developments with StruWalker and StruConnect make impressive use of the available data and look to be excellent products for bringing structural engineers closer into the digital design loop.

All in all, StruCad is undoubtedly a very capable product for modelling steel, and producing 2D drawings and CAM data, and with its tight integration with StruM.I.S it's also certain to start receiving more attention from those in management.

www.acecad.co.uk

Basic workflow in StruCad

- Set up a grid and floor-to-floor levels.
- Select hot rolled steel from an extensive database, place and orientate.
- Copy and array members throughout the grid.
- Build up a basic framework, adding beams using a variety of snap modes.
- Using StruCad's extensive collection of parametric macros, carry out standard connection details via easy-to-use dialogue boxes.
- If a member size subsequently changes or moves, connections will automatically update.
- Copy and array connections around a model regardless of orientation and size.
- Non-standard connections can be built up plate-by-plate, weld-by-weld and bolt-by-bolt and stored parametrically for future use.
- Cold rolled steel from all the UK manufacturers can also be added from an extensive library and connections detailed.
- The finished model can be automatically verified and checked for clashes.
- GAs and fabrication drawings can also be automatically produced from the StruCad model.
- StruCad can then export CAM files for hot rolled and cold rolled steel, including angles notches, holes etc.
- StruWalker can then be used by the engineer to interrogate the model and feed back any design changes.
- Material lists and reports can also be generated.



Metport is able to automatically design Metsec purlins and rails within an elastic-plastic portal frame analysis and bring the design into StruCad to automatically detail members and connections.

Floor show

For the construction of St George Wharf, a mixed-use development on London's South Bank, multi-discipline consultant White Young Green, used Lusas Civil and Structural analysis software to help assist in the detailed design of the complex floor slabs.

St George Wharf is a mixed-use riverside development comprising offices, shops, a hotel and high-quality housing. It is situated on the South bank of the River Thames next to Vauxhall Bridge in London. The residential part of the scheme currently under construction comprises five multi-storey tower blocks all having a reinforced concrete frame built on piled foundations. The towers increase in height towards the central tower, Flagstaff House, which is 22 storeys high. Whilst floors are of cast in-situ reinforced concrete, the development makes extensive use of pre-cast concrete balcony slabs and wall panels help reduce each block's construction time to the absolute minimum.

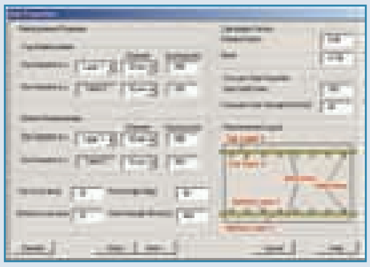
Slab design

Multi-discipline consultant White Young Green is providing civil and structural design for the 2nd-5th phases of the residential tower construction. Floor layouts are different all the way up the towers and numerous service holes in the slabs combined with irregular slab shapes mean that using the simplified design methods for flat slabs in BS8110 is just not possible. Because of this, White Young Green chose to use Lusas Civil & Structural analysis software to assist with the detailed design of the floor slabs. For this work the Lusas RC slab design facility is particularly useful in producing accurate contour plots of reinforcement bar diameters to aid with the detailing of each unique floor slab arrangement.

Floor modelling

The slab geometry for each floor comes from AutoCAD via a DXF file. Tim Dodd, project engineer at White Young Green explains the process involved: "We strip-out all irrelevant geometry from the AutoCAD file and create a DXF file for import into Lusas. Then we apply a regular mesh arrangement, add supports and loading, and analyse and process the results using the RC slab design facility". A conservative approach to modelling the column supports results in two models being required for each floor level. In one model simply supported column supports are used to give worst-case span moments, and in the other, restraints at column positions give worst-case hogging moments over supports. This method avoids the high peak hogging moments that can sometimes result when a single support is used in a finite element model to represent a column position.

RC slab design wizard



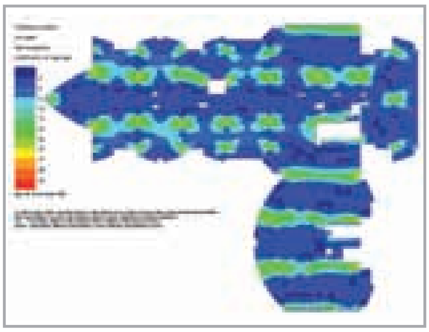
The Lusas RC slab design wizard enables slab reinforcement to be computed in accordance with BS8110. Additional calculations of crack widths can also be carried out in accordance with BS8110 and other design codes. Line or colour-filled contours of either reinforcement steel area, bar diameter, or K factor can be plotted to aid the detailing process. Crack width contours can be plotted over the entire structure based on calculated nodal values or allowable crack widths.

Reinforcement plots

Large-scale line or colour-filled contour plots are produced from Lusas using the RC slab design wizard and these enable direct measurement and scaling of extents of reinforcement bars. If bar contour plots from Lusas are set to show, for example, a blanket of T12's at 150 centres across the whole slab, areas where additional steel is required can be easily identified. Tim Dodd, Project Engineer at White



St George Wharf from Vauxhall Bridge.



Contours of reinforcement bar diameter for Ultimate Limit State



Young Green said: "The main benefit of using Lusas analysis software on this project is that it handles all the complicated flat slab geometry and holes, produces bar reinforcement contours, and enables us to design slabs that are almost impossible by hand."

An assessment of potential slab deflections and an investigation into the early striking of concrete was also investigated by White Young Green. The on-site measurements of slab deflections compared very favourably with Lusas predicted values.

White Young Green is also providing design advice to its client, St George plc, for a proposed 181m high, 49 storey residential tower to the south of the main residential blocks. Originally conceived by architects Broadway Malayan, when built, it will be the tallest residential tower in the UK.

www.lusas.com

Adobe Acrobat 7

After gaining a secure footing in the CAD market, almost by chance some might say, Adobe has re-channelled some of its PDF development resources to 3D, and design/review.

Martyn Day

Product: Acrobat Professional 7 **Supplier:** Adobe **Price:** £395

Adobe's accelerated development of its universal document, PDF, continues this month with the release of Acrobat 7, both in Standard and Professional (PDF creation) varieties, as well as a new free Acrobat Reader. While many of the feature-additions serve vertical markets, such as pre-press, graphic design and broad business applications, like MS Office, Acrobat 7 has a number of really useful new capabilities for the AEC and MCAD design professional.

This past year has seen many of the Engineering software vendors either increasingly promote or deliver their own 'open' publishing formats for both 2D drawings and 3D models. Autodesk has continued to promote and expand its DWF format, Dassault Systemes (DS) has recently announced its 3DXML format, UGS has delivered a free JT-based utility and Intel has been promoting its U3D standard. So, the fight is on for the format of choice within the AEC and Mechanical spaces. With the previous release of Acrobat (6), Adobe concentrated on increasing the 2D drawing capability of PDF, especially from within AutoCAD (but not LT). A deal with Bentley Systems saw a PDF creation capability being built into their flagship product, MicroStation.

Throughout all these battles and pitches to the press as to 'who's better, who's best', there's a lot of talk of these formats being 'open', and on reflection you do have to take this marketing with a large dose of sodium chloride. How open is open? It's obviously desirable, as every man and his dog claims to be 'open' but none can truly prove this. The majority are 'open' as the format is a published format, then on every other level it's proprietary. And while the format may be documented, is it fully documented, or are there parts that are off limits? Other formats are endorsed by International standards bodies, which on the face of it, is great but do other vendors, including competitors truly have their say of what gets added in future revisions? The truth is every player in this Publishing format war is proprietary to some degree, there are business cases driving their development and adoption - the real question is does the format do what you want it to do, and communicate what you want? The documented 'openness' and standards bodies only really help should the company in question go bust and you need to have access, or should you want to gain access to the data without the vendor's own software tools.

The basic requirements are that the format supports the data set you want to send, it's easy to transmit, read and accurately displays the intended design and any associated information, hopefully with some level of security - anything above that is a plus.

If you go on sheer popularity, PDF is the format of choice, PDF readers are everywhere and total hundreds of millions of copies worldwide. It's a massive business for Adobe in government, business, creative and engineering sectors. Through exposure to some of the more demanding customers, Adobe has championed the standard-body route, working with key industries to get PDF – or variants, like PDF/E (Engineering), PDF/A (Archive), which are subsets of the full PDF format - accepted as official industry standards. Out of all the publishing formats, PDF is undoubtedly the most flexible, being capable of encapsulating most types of digital document within the PDF wrapper, although in comparison to 'CAD' publishing formats like DWF or 3DXML, it's not as accurate, lightweight. or 3D. Acrobat 7 certainly addresses a number of these issues, as well as introducing a few unique capabilities. »

> Out of all the publishing formats, PDF is undoubtedly the most flexible, being capable of encapsulating most types of digital document within the PDF wrapper

U3D: Intel's 3D standard

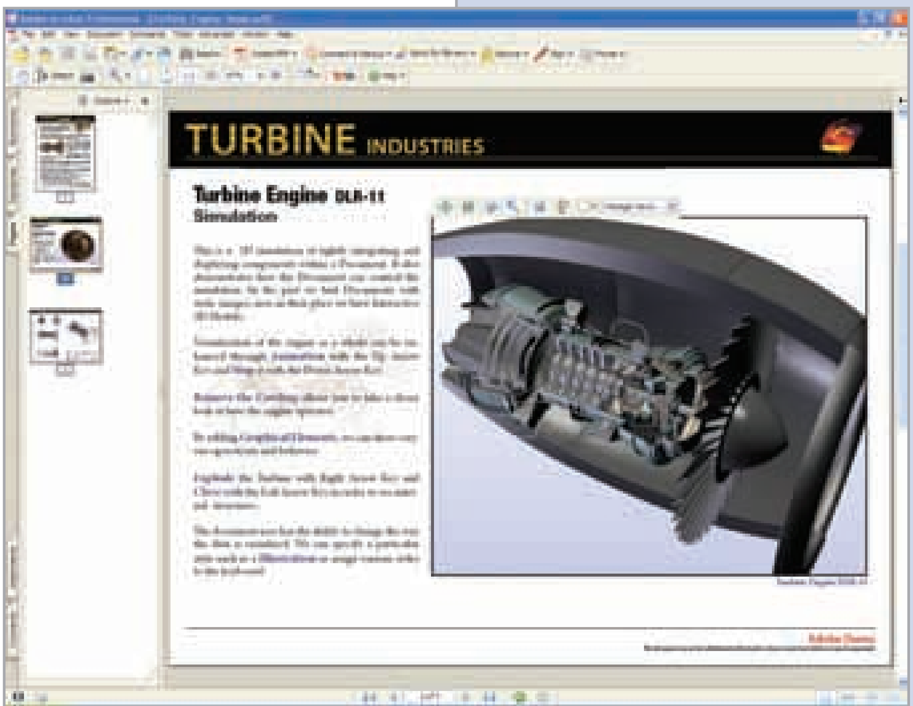
U3D's features include:

- Continuous level of detail
- Progressive streaming
- Compression
- Rigid-body and skeleton-based animation
- File format and run-time extensibility

Intel on U3D's benefits: "Extensibility will be a key feature, allowing the addition of new modifiers that can change a 3D model. The use of the standard Common Language Runtime (CLR) with the associated Common Intermediate Language (CIL) for plug-ins – and the inclusion of their required interfaces in the standard – will facilitate cross-platform availability. Write them once and they will work with a variety of different operating systems. This encourages ecosystem development, enabling developers to differentiate their offerings by building on top of the standard. Developers can extend the file format on their own without being dependent on the 3DIF. By allowing market needs to be addressed quickly, this extensibility will help facilitate the longevity of the standard. "

www.3dif.org

Acrobat 7 includes support for Intel's U3D standard, allowing the embedding of 3D models in PDF documents, providing shaded views, animation and some interaction.



So What's in 7?

For every release of PDF, Adobe has to concentrate on speed of creation and compression, as PDFs can get quite large and there is increasing competition from engineering vendors, such as Autodesk, and Dassault Systemes (DS). There have been some improvements here, in the speed of application opening, PDF creation and size of PDF.

When you get into the nuts and bolts and new features and enhancements, it's obvious that 7 is a pretty comprehensive update to Acrobat. For CAD file usage and workflow probably the most immediate benefit and interesting feature is the capability to extended the functionality of the free Acrobat Reader depending on the settings in the PDF. While the Acrobat Reader by standard offers view and print capability, it's now possible to choose to expand the reader to allow the addition of highlights, 'stickies', draw and comment. Prior to this exciting capability, the recipient would also have to have possessed Acrobat Professional. This simple addition really alters the dynamic of the traditional view and mark-up market.

3D

If 2D drawings wasn't enough of a battleground, there are even more players in the 3D file format market. It was essential that Adobe incorporates some 3D support within PDF and Acrobat 7 includes support for Intel's U3D standard, allowing the embedding of 3D models in PDF documents, providing shaded views, animation and some interaction. The choice of U3D does seem a little weird and perhaps even weirder that it's Intel behind the standard. According to my sources, the origins of the U3D standard comes from Intel's wish to popularise 3D, as it drives processors and stimulates demand. As a non-CAD company, Intel is also in an interesting position to co-ordinate development with the key CAD players. Indeed, all the major developers, as well as customers like Boeing joined the 3D Industry Forum (3DIF) helping specify the U3D standard but then one by one, each drifted off to 'do their own thing', leaving us with a choice of seven or eight, 'standards'. U3D continued nonetheless and is now mainly championed by Bentley Systems (MicroStation) and Adobe. Adobe shoes the format as the Intel procedure and commitment to make the format an ISO standard is in-keeping with its own philosophy on having an 'open' format – that and picking an existing vendor's format – such as UGS's JT or Autodesk's DWF, would not get the buy in from other vendors.

This leaves Adobe's 3D support somewhat isolated at the launch of Acrobat 7. For the CAD software vendors to write 3D to PDF, they would need to support U3D and it seems they each want to try and push their own 'standard' first, for a while. Either Adobe will have to expand the range of 3D formats it can embed and display, or the vendors will have to adopt U3D. I have a feeling that it's going to take a bit of both to get a broader industry solution. I certainly can't see Autodesk supporting U3D, if it's going to ultimately help Adobe, at some point there may have to be some translators written for all these different 'open' standards!

PST

The other new feature that blew me away in Acrobat 7, was the support for Microsoft Outlook and its email archive format – PST. I hate Outlook and I think it hates me. You might not know this but Outlook has a 2Gb limit and should your email archive exceed this then it starts acting like a sulking pre-teen. The only option, it seems, is to download a utility off the MS website that somewhat brutally cuts the PST file down to size, losing a good few 100s of Mb of emails in the process. Welcome Adobe Acrobat, you can now take those PST files and create a PDF document of all your archived emails. PDF maintains all the text, links and embedded files within the PST and creates a compressed searchable PDF. PST files are most certainly not compressed, actually the opposite, they are real bloaters. If you get a lot of emails, or just want to find a decent way of archiving your project email documents, then Acrobat is worth buying just for this feature.

Forms

Form creation was always a bit of an art with Acrobat but now when combined with Adobe LiveCycle Designer software (which comes with the software but is only available for Windows), it looks to be really easy to design PDF forms. The layout tool is easy to use and can Incorporate business logic, such as calculations and data validations. This could reduce the barrier to moving to that ideal of a paperless office.

Manage

With a tighter integration with Microsoft Office, Internet Explorer and Access, Acrobat 7 offers a cool visual 'Document Assembly' feature, allowing documents to be mixed and matched into project document sets.

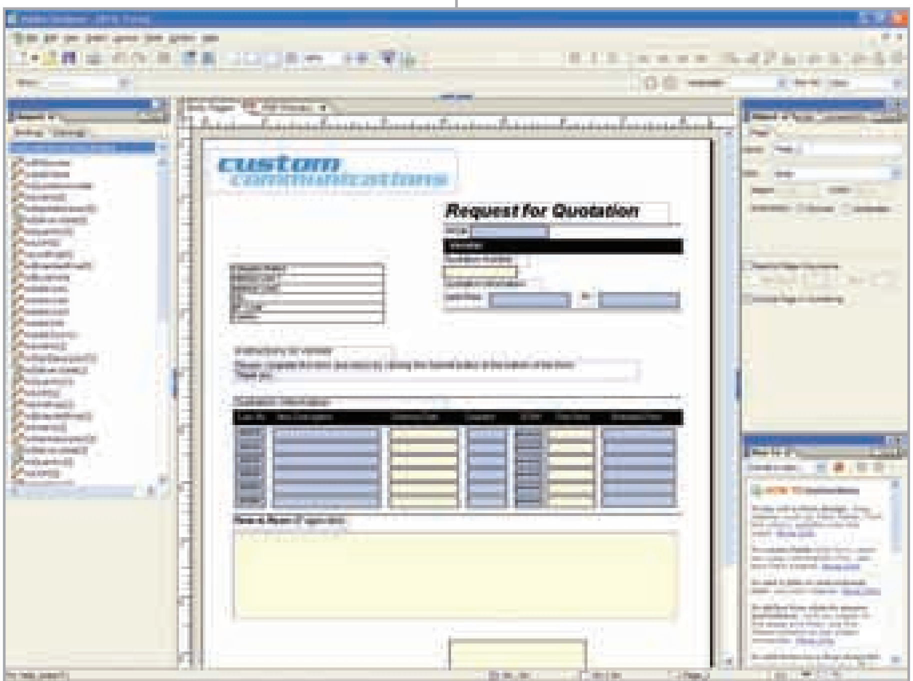
Conclusion

There's a lot more to Acrobat 7 than the features I have highlighted here. I have just focussed on those of immediate benefit to the AEC and Engineering fraternity. Since Adobe launched Acrobat 6 there has been an ongoing war of words between Adobe and Autodesk, with Adobe doing less of the talking. Autodesk's aggressive push on DWF has managed to push most of the other vendors towards helping Adobe out with technology and penetration of the CAD space. The perception is that Autodesk already has too much of a hold on the industry with 2D DWG and the battle of the formats will be decided on 3D not 2D.

Adobe has initiated the creation of a PDF/E variant which selects a subset of features from PDF to produce a dedicated engineering version of PDF. This is being headed up by an independent body and Adobe has invited the CAD players to take part, even (eventually) Autodesk – which I understand is even attending the meetings. There is a 3D working body too, which is actually headed up by SolidWorks, which has its own publishing format, called eDrawings. Other companies like Bentley are working even more closely with Adobe, extending the capability and accuracy of its 2D drawing support. So, despite my fear that the CAD industry is, once again, proving incapable of working together to deliver true standards for their customers, there is some light at the end of the tunnel.

www.adobe.com

Autodesk's aggressive push on DWF has managed to push most of the other vendors towards helping Adobe out with technology and penetration of the CAD space



Master and servant

Ordnance Survey's Mastermap promised the earth when it was launched, but its uptake in the AEC sector has been limited. James Cutler of eMapSite puts forward the case as to why CAD and GIS users should choose MasterMap as their mapping base.

James Cutler





An example of eMapSite's eXMap product as available via MultiMap. (Images copyright eMapSite and Suppliers 2004).

In the years since the launch of OS MasterMap there has been only limited change either in the use of large scale mapping within the historically CAD-centric AEC sector or in the adoption of a digital map base that might enable the scope of use to be extended. This scenario is not without its exceptions, most notably the ever-wider adoption of GIS and of GIS-enabling mapping within the sector and the increasing integration of CAD and GIS.

OS MasterMap itself is an over-arching term that encompasses topographic, address, imagery and transport network databases. Much of the early talk was a data story around the format (GML) and the data structure and the use of terms such as definitive and intelligent. This was not an applications story or a business story but rather a technology one and to early adopters in the GI community this was fine but to CAD users it was next to impenetrable.

The AEC sector has been characterised as having a silo type business model in which corporate capabilities exist either within departments (however defined) or as service centres. For most a CAD capability is an established part of the business serving different mostly "hard" engineering disciplines while GIS is the upstart serving other typically "softer" disciplines from a usually very different part of the organisation. Established traditions and mechanisms for the acquisition and use of data can contribute to inertia and a reluctance to or the lack of a framework for the exploration of alternatives be it software, data type or supplier.

The longevity of SuperPlan Data and its source, Land-Line, within the AEC sector alongside the adoption of OS MasterMap by GIS users merely reflects these realities. With the withdrawal of Land-Line drawing closer and likely to be preceded by pricing premiums as the Ordnance Survey pursues a more aggressive large scale data migration strategy, it is timely to consider the advantages that such a migration affords.





The structure of OS MasterMap allows the user to easily separate out features as illustrated above. (Images copyright eMapSite and Suppliers 2004).

Convergence

GIS and CAD have one major common characteristic: both handle spatial data and their constructs, topology, geometry and attribution. However, with origins in the design and representation of largely 3D orthogonal features in small areas, CAD differs from the at best 2.5D georeferenced world of GIS. Convergence of the two tool sets is in many ways inevitable as real world applications from site identification through plan development, data collection, environmental impacts, virtual realisation and ZVI to site layout, construction planning, landscaping, site remediation and even marketing require both GIS and CAD "views" of the same data.

Businesses demand the same efficiencies from integrated data management as they do from interoperable software. A common data framework drives down the total cost of ownership of spatial data within projects, eliminating duplication in training, in procurement, in management, preparation and maintenance of the data, allowing the same data model to be used as the foundation for all project activities. OS MasterMap provides an interoperable data framework that sits comfortably within this paradigm.

> It is only a matter of time before the initial offerings of free web or software applications are extended with other functions and data sets to create a personal interface to OS MasterMap that will make Land-Line a thing of the past

Structure

Land-Line is an unstructured "spaghetti" data set supplied in tiles of varying sizes (from 500m x 500m to 5km x 5km). These tiles have limited utility beyond backdrop mapping – indeed by Ordnance Survey's own estimates more than 80% of all large scale mapping was only being used as a backdrop at the time of the launch of OS MasterMap. Both the inherent structure and the tiled nature of the product makes Land-Line a time consuming prospect when considering the interdisciplinary requirements and capabilities of organizations using both CAD and GIS tools. Users can often be found building polygons, redigitising features and merging individual features (for example, across tile boundaries) in preparation for map output rather than generating useful output directly from the data supplied.





OS MasterMap is the most up to date mapping available for GB and due to the structure of unique features the database is continually being updated. (Images copyright eMapSite and Suppliers 2004).

This has a significant cost of ownership as well as opportunity cost implications for any business that can be reduced through migration to OS MasterMap.

OS MasterMap is a structured, non-tiled database of some 430 million features suitable for cross-platform usage. OS MasterMap is separated into a number of layers according to feature type (including points, symbols, areas, annotation and polylines). By comparison the DXF format in which Land-Line is delivered does not offer such flexibility or ease of use.

If you use OS MasterMap in conjunction with Land-Line within your CAD and GIS systems there is no doubt you will notice the different data structures. OS MasterMap can be supplied by some OS Partners in GIS and CAD compatible formats such as DWG, shapefile, DGN and TAB, retaining the inherent data structure of OS MasterMap while Land-Line and SuperPlan Data's DXF eliminates this structure and requires reprocessing to come up to such a standard.

Representation/portrayal

The classification of 430 million features in OS MasterMap into common feature types enables users to apply different schemas/styles/libraries to each feature type and to attributes thereof to create useful and/or compelling outputs. Land-Line Feature Codes offer a far more limited capability in terms of building informative and content rich outputs for different constituencies.

This is especially the case in all those cases and environments where GIS or CAD add a layer of complexity between end user and requirement that is entirely unnecessary. There are already a number of web services that use OS MasterMap to generate colourful and informative map snapshots of small areas using the full richness of the underlying data.

With high levels of capital expenditure across government in recent years this scenario has in some instances resulted in commercial CAD and GIS users playing catch-up in response to client demands. The impacts of this are only beginning to emerge but can be expected to play a significant role in extending awareness of the advantages of OS MasterMap across the sector. Early migration to OS MasterMap has further business drivers owing to the need for long term continuity of data management (Land-Line WILL be withdrawn eventually) and compliance with both client procurement terms and their operational systems.

OS MasterMap itself with its overtures of enormous databases and the associated costs and risks of owning and maintaining these is also likely to extend awareness of the value of web services that are based on OS MasterMap or incorporate the tools that allow OS MasterMap to be accessed and exploited. Light-weight components that use web services protocols are already delivering OS MasterMap accessibility to the desktop of many a CAD and GIS user be it via free web or software application and it is only a matter of time before these initial offerings are extended with other functions and data sets to create a personal interface to OS MasterMap that will make Land-Line a thing of the past and provide users with the flexibility to use the appropriate application for their requirements rather than try to fit all their requirements into one application.

This article was written by James Cutler, CEO at eMapSite, a platinum partner of Ordnance Survey. You can order the latest OS MasterMap and browse the widest selection of mapping and geo-data for GB at ***www.emapsite.com***

Shifting the Balance

The last ten years have resulted in revenues of billions for developers, yet they have not made any great leaps forward to offer the user. Maybe it's time to think outside the box and offer the user better returns on their investment, says Dick Pilkington.

Dick Pilkington

As the Engineering Applications market reaches maturity, the cost of a 3D software seat has been driven down from $20,000 10 years ago to $10,000 today and to a few hundred dollars for a 2D seat from a few thousand. Margins in the supply-chain have been reduced to such an extent that in the last decade the number of indirect channel partners has contracted drastically – by over two-thirds in the UK for example.

Developers, to maximise their revenues, with new seats plateauing and competition increasing, have taken-over many of the value-added services previously delivered by their channels. Faced with zero or slow growth in core products, developers have responded by assuming distribution and customer facing sales roles, such as subscriptions and maintenance, through the Internet or via direct regional sales and support offices.

Gathering such information as email addresses and customer databases has given the developers much more control of the sale, distribution and support of their products than previously existed. The compensation for users and prospective buyers has been that the price of new software has effectively halved. Given that the maintenance of revenues in the large developers has often been at the expense of their channel and partners, it might be fair to ask the question has the user benefited much in the last 10 years?

At IntelliCAD World in Denver this year, Evan Yares of the OAG, posed a provocative view on whether the returns on investment in current software are too highly focused on the developer than the user. He questioned the performance of the current corporate model of the software industry. A user who is expecting real progress in making his job easier by buying new or upgraded software may be disappointed. They may also find it a poor investment, once the training courses have made clear the developers' arcane routes by which everyday jobs are supposed to be made easier.

Evan argued the reason that such easy jobs are made so complex is that current software architectures are not capable of supporting the great leaps in usability expected by customers, especially in light of the maintenance and usage fees charged by their developers. A much more cost effective way in terms of the software dollar would be to use products that standardise around common architectures and cores. More than that, only by developing a fundamentally more flexible architecture would users get the systems they deserved and have paid for. This architecture need not necessarily be compatible with those offered now or which is currently dominant.

Linux has shown that people want, and are prepared to look for, choice in what software they run. Even Linux users pay for their software – the packagers of Linux make charges to cover distribution and utility packs – but this is a fraction of the price expected by any of the major software vendors at the moment. Though the OAG and the ITC are different types of organisation, they have one thing in common – they are both not-for-profit organisations, run on behalf of their members. These members include both developers and users of software, from a wide variety of applications areas and geographies. Use of source code, component libraries and tools, maintained by these organisations, should make software development much cheaper.

The resulting price to the end-user must also reflect that lower cost and allow the development focus to be the creation of innovative products, not shareholder value, stock options and dividends.

Using business and design software is still as quirky as it ever was. The number of things which could go wrong writing this article, running on a Broadband VPN, using MS Office and Windows XP, are many and often-un repeatable in their nature. So are my responses when they happen! Evan Yares has a point that we shouldn't just shrug and reboot; if our CD player or mobile phone starts to crash or hang, we take it back to the store and get one that does work! Why not with software?

As Yares said, "Software S***s!", under the current development process, which is less of a coherent architecture and more of a battlefield of vested interests. Perhaps what is needed, as Evan suggested, is a completely new architecture for engineering applications, one which does not make information prey to proprietary formats and lock-in, but makes it available in a format that matches the requirement of the user at any point in the lifecycle of a product or design. Unfortunately, this architecture does not yet exist and would require a discontinuity that rendered much investment in current tools worthless. Not a good proposition for users to contemplate.

However, "I wouldn't start from here", is not a good argument against Yares' thesis. The last 10 years have resulted in revenues of $billions to the developers, yet they have not made any great leaps forward to offer the user – in fact things have become more, rather than less, complicated to use – nor have we seen any great desire by developers to promote open access to their data to make it easily available to other applications. If the reason for this is self-interest, then Yares is right; maybe it is time to think "outside of the box" to offer the user, not the developer, better returns on their investments.



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Piranesi 4

It's been two years since the last release of Piranesi, the non-photorealistic rendering solution from Informatix. Since then the Cambridge-based developer has also released a Mac version and with Version 4 added support for 3D cutouts.

Greg Corke

Product: Piranesi 4 **Supplier:** Informatix **Price:** £450

CAD is a fantastic tool. You can draught, model, and edit to your heart's content. And with a suitable understanding of light, texture and perspective you can give your project an unparalleled sense of realism with photorealistic renderings. But CAD can also be a hindrance. It can stifle creativity, and discourage architects from investigating alternative concepts as they are forced to tie down their designs early on in the design process.

Of course the obvious antidote for this is the humble pencil and paper, and these two simple pieces of equipment remain useful weapons in an architect's armoury. However, in recent years the CAD software developers have also been conscious of this apparent void in the architectural software sector and a range of conceptual design tools have been brought to market.

While products like SketchUp present architects with an easy to use modelling environment, Piranesi from Informatix Software helps bring these designs to life, enabling users to express design concepts simply and effectively with simple painting or rendering tools. So how does it do this?

Piranesi takes a 3D CAD model, and turns it into a raster image, onto which users can paint textures, colours or tints. You might think this sounds a lot like Adobe's Photoshop, and in some ways it is. However, Piranesi differs from the industry-standard photo-editing package, insofar as each pixel in its dedicated Epix raster image format also stores depth and material data as well as colour.

The net result is that textures and colours can be applied to a scene by using a number of so-called intelligent rendering/painting tools. Users can restrict the application of a colour or texture to certain areas on the scene, locking plane, orientation, material or colour. As such it enables users to create a wide variety of masks at the click of a button.

Using a combination of colours, textures and blends, scenes can be rendered in a huge variety of styles from pencil sketches to watercolours, soft or hard edges. Colour can be applied in fills, washes, dabs, splatters, and scribbles, and filters can be used to blur, sharpen or smudge the overall image, a bit like Photoshop.

If textures are applied, Piranesi automatically deals with perspective. For example, if you paint with a brick texture, the bricks get smaller as they get further away, and the horizontal lines of brick courses converge towards the vanishing points of the scene.

As with traditional pen on paper rendering, it's down to the individual to express their own style and while I'd say anyone could use Piranesi, you do need a fair amount of artistic flair to get the top results and time on your hands to learn how to make best use of the available tools.



Users can now take 3D models in 3DS, SketchUp, MicroGDS, and DXF formats and place them in Piranesi scenes as 3D cutouts.

Scenes can also be brought to life by adding 'cutouts', such as such as people, plants, trees, furniture, or cars. Piranesi comes with an extensive library of cutouts which are automatically scaled on the fly depending on where you place them in the scene, and because they are masked, will be hidden by any objects that appear in front of them.

New for version 4

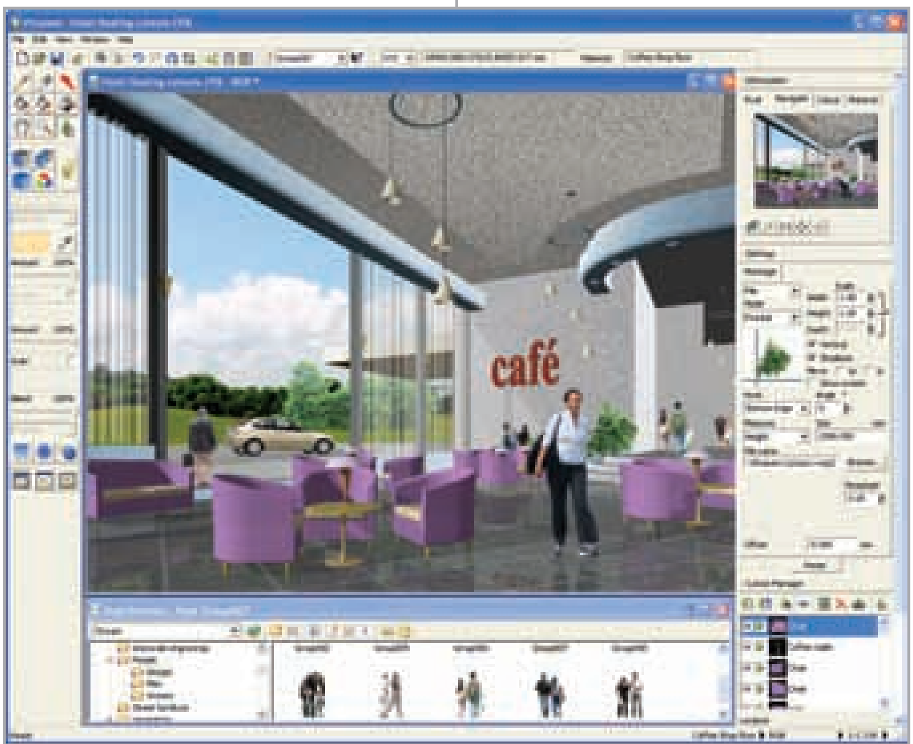
It's been two years since the last release, and while Informatix has undoubtedly been spending some of its valuable development resources on porting Piranesi to the Apple Mac, it's also come up with some pretty cool new tools and features for Version 4.

If you've used Piranesi before, the first enhancement that jumps out at you is the new Tool Manager which resides on the right hand side of the screen, and helps consolidate the number of dialogue boxes used in previous versions. The Tool Manager incorporates three palettes which can be expanded and collapsed as required.

Another interface enhancement that is bound to appeal to those using Piranesi on a regular basis is keyboard shortcuts. Despite huge advances in GUIs over the years, I still believe you can't beat the keyboard for speed of input.

The most impressive new feature is the ability to place 3D models into scenes. Building on its ability to work with 2D cutouts, Version 3 saw the introduction of support for RPC (Rich Photorealistic Content) from Archvision, a collection of 2D cutouts, which can be viewed from any angle (see www.archvision.com for more info). For Version 4, Informatix has taken this to a new level and opened up Piranesi to enable users to place true 3D content (in 3DS, SketchUp, MicroGDS, and DXF formats) into scenes as 3D cutouts.

Piranesi ships with a basic collection of 3D models, predominantly in 3DS format, which include basic furniture fixtures and fittings. However, it will come as no surprise to many that the Internet is also a huge repository for this type of content, many of which are available for free. www.e-interiors.net is a great resource for all types of furniture and fittings, and www.turbosquid.com for pretty much anything you can think of. You can of course knock up your own content in SketchUp, 3ds max, or MicroGDS.



The new Tool Manager resides on the right hand side of the screen, and helps consolidate the number of dialogue boxes used in previous versions.

Compatible products

Epix files, Piranesi's extended raster format, can be created from the following CAD applications:

- 3D Studio Max and Viz
- ArchiCAD
- Architectural Desktop
- Art*lantis
- AutoCAD (via Vedute)
- Autodesk Building Systems
- Cinema 4D R8
- form*Z
- LightWave
- Bentley MicroStation
- MicroGDS
- NavisWorks
- RenderWorks
- SketchUp
- VectorWorks

As with their 2D counterparts, 3D cutouts are scaled automatically according to the depth at which they are inserted into the scene, and once inside can be rotated and scaled (or tweaked in Piranesi speak) with the use of handles.

Elsewhere, Piranesi is often used for indoor or night time scenes, and new illumination fades allow spot or strip lighting to be easily mimicked. Seven new filters have also been added and there's a new bristle brush, where users can choose how many bristles the brush has. The brush and painter applicators also have new dynamic capabilities, which cause the painting effect to vary along the stroke.

In addition to a number of other subtle additions across the board, Piranesi 4 includes a much-improved tutorials section, which include some excellent videos, which I'm sure will be welcomed by new and existing users alike.

Conclusion

Piranesi continues to go from strength to strength and still manages to impress, release on release. The introduction of 3D cutouts looks like a major step forward and will provide architects and designers with virtually unlimited options when it comes to bringing their designs to life with furniture and fittings and the like. Usability has also been enhanced for Version 4 and you can't underestimate the potential benefits that the new video tutorials may bring when introducing new rendering concepts.

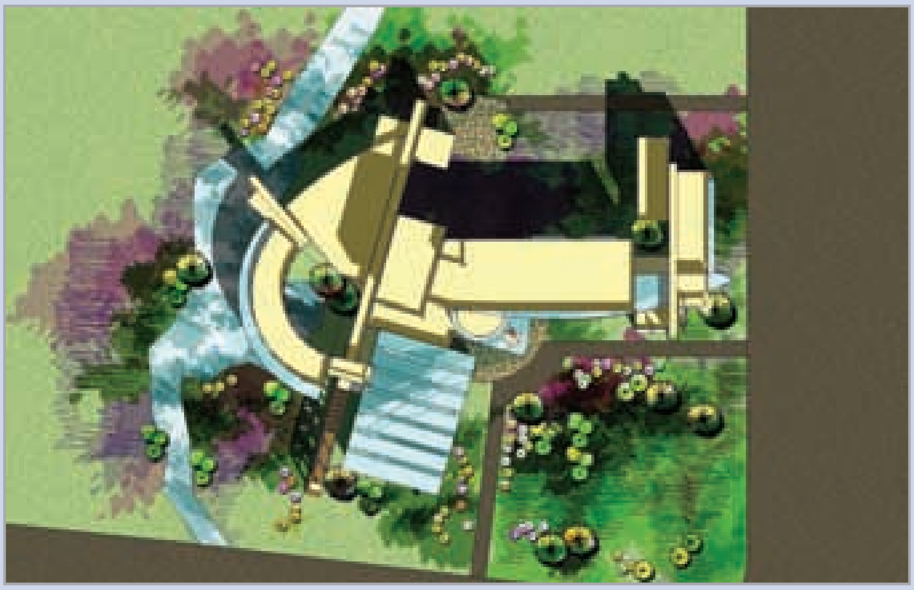
Piranesi fills a unique role in the architectural market, and with such a wealth of rendering tools can mean many things to many people. It's a fantastic tool for investigating different design concepts at the early stages of the design process, but can be equally adept at communicating finished designs. If you feel you're inhibited by some of the more 'mathematical' rendering solutions on the market, Piranesi is definitely worth investigating, but don't expect instant results. A combination of patience and artistic talent is needed to get the best out of the product, but with both a whole new world of non-photorealistic rendering awaits you.

www.informatix.co.uk

Piranesi 4 gallery

Images courtesy of WangWang, Shanghai
wang-wang@vip.sina.com







Autodesk Inventor for AEC — part 2

Lawrence Hooker

UK reseller and industry consultant, Excitech was recently appointed to sell Autodesk's MCAD solid modelling solution, Inventor, into the AEC market. The software's ease of use and ability to model complex shapes is finding favour with a number of UK practices.

Last month we introduced the idea of using within construction design projects a design tool which is conventionally considered to be for mechanical/manufacturing designers. The specific CAD tool used was Autodesk Inventor which Excitech has pioneered in construction projects to permit greater creativity in design, more rapid and accurate development of working drawings and greater confidence in the "integrity" of the results. This month we look at where Inventor fits into the design process and how it interacts with other design tools.

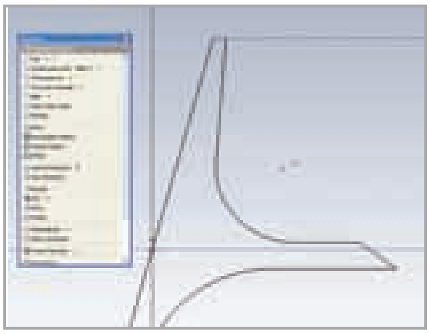
The appropriate tools

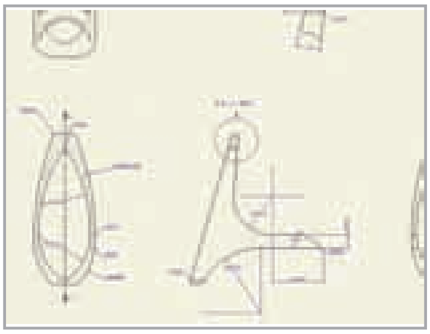
Construction project design requires a mixture of skills from a variety of industry disciplines such as civil engineering, architecture, structural engineering, building services, mechanical engineering, etc. The co-ordination of the project, especially its design, through many stages and iterations is a significant challenge, so data interchange between the different design tools used is a critical requirement. Adding an additional design tool might be seen as a further complication, but not if data can be easily exchanged and the process is defined.

Conceptual design

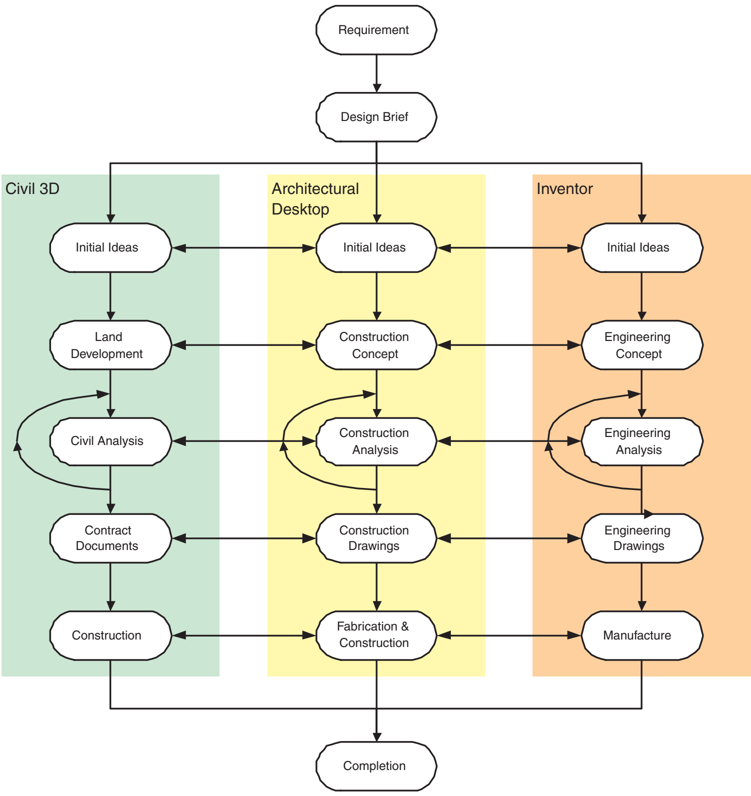
The initial steps of any project may be described as the concept stage; identifying the need, producing a design brief and creating initial design concepts. At this stage Inventor can be used to rapidly generate a design or multiple design options using simple 2D sketching tools with parametric controls. 2D constraints can be added without the need for dimensions to stabilise and constrain the major design features of the shape. Shapes can simply be pulled and will obey any constraints that have been placed. If required, the sketch can be extruded, swept or lofted to form a solid model for aesthetic analysis.

This exploration of the mechanical design would typically be carried out in parallel with similar processes taking place in the civil and construction/architectural disciplines with the priority on each area determined either by the nature of the project, the client or the prime contractor. Key, however, is that design data – even at this early stage – may be moved from one discipline to another so that the overall concept options may be reviewed and considered.





In Inventor the conceptual 2D and 3D sketches or models can be enhanced, modified and "constrained" by adding dimensions and other required details.



Design/Data Flow

Developed design

Once the concept has been approved, then the next stage of developing the design can be embarked on. If the right software tools have been used in the previous stage then the concept data can be easily developed towards the final detailed design. In Inventor the conceptual 2D and 3D sketches or models can be enhanced, modified and "constrained" by adding dimensions and other required details. Inventor assists this process by automatically tracking the design and highlighting those items which have not been fully defined. Basic analysis of the developed model can include mass, volume and surface area. Inertial properties and centre of gravity can also be obtained.

With Inventor Professional finite element analysis of a single part can also be performed. Inventor Professional uses the Ansys engine which will allow a fast mesh to be generated and safety factors to be built in. The Ansys engine has been created for the designer to glean basic ideas of stress areas. This can then be exported to the full Ansys product for more detailed work. The 3D design can also be exported as a SAT, STEP or IGES format for further analysis in other FEA products.

As the design of the components, or indeed whole assemblies, progresses similar project design developments may be taking place by other designers using other CAD tools. Key to the effectiveness of using Inventor within construction projects is the ability to rapidly move data between the design disciplines. 3D solids can be exported from Inventor and imported into common construction industry design tools such as Autodesk's Architectural Desktop (ADT) as mass elements. These ele-

ments can be handled by ADT as objects much like any other construction component allowing the designer or team responsible for the overall project to work in parallel on the overall construction design. Similarly the construction project data may be imported from civil engineering design tools such as Autodesk Civil 3D so the project may also be seen and developed within this discipline.

Construction, production and manufacturing (working) drawings

One of the great benefits of designing using models is the speed and ease with which working drawings including plans, elevations, sections and details can be produced. Users of ADT will be pleased to learn that Autodesk Inventor provides similar benefits. From the 3D model in Inventor full sets of drawings can be produced – and, as with ADT, any changes made to the model will be reflected in each relevant drawing. Detailing can also be done using tools such as AutoCAD Mechanical which has a standard AutoCAD interface (and a lower price tag than Inventor!); so opening this up to more and other members of the design team. And this detailing is still part of the Inventor model so any design changes are still an integral part of the design and will still be reflected in other views, drawings, schedules etc.

Another benefit of Inventor is that where the design is to undergo a manufacturing process this may be automated too. Once the 3D geometry of the product has been fully described this can then be transferred to CAM,

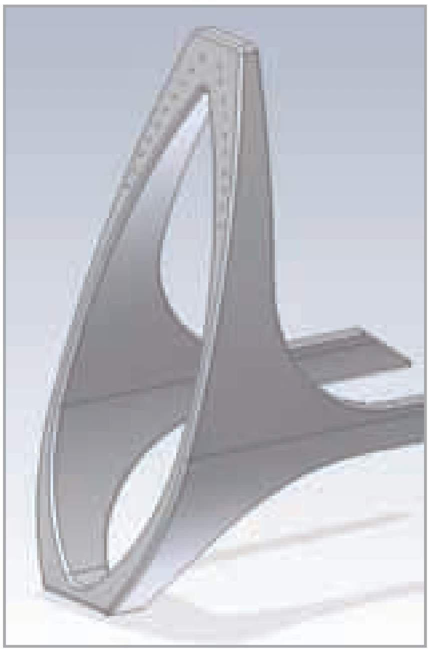
>> 3D models inside Inventor can be analysed using Finite Element Analysis (FEA) tools, or used to produce a full set of 2D drawings or automate the manufacturing process by generating a CAM file.

a Computer Aided Manufacturing system for machining, laser cutting, profiling, milling etc. The software used will depend on the manufacturing processes and machine tools available but this ensures the step from design to production is made with greater speed and accuracy even for the most sophisticated profiles and shapes.

As at the earlier stages data can be easily transferred between Inventor and other design environments so the best design technology tools may be used in each environment using the latest revisions of the design to produce engineering drawings, construction drawings and contract documents. In each case producing the documents required for construction in the format and detail needed for each area with the advantages of the co-ordination which has taken place at each stage.

Innovation through innovation

As identified in the previous article, the trend towards innovative design in the built environment is strong; everywhere we see references to "iconic structures", "design statements", "form for function" and the like. Yet carrying such visions through from concept to design and into construction and completion can be a real challenge for all involved in the project. But using the latest in design technologies and introducing them in innovative ways – in



environments they might not otherwise have been used for – has been found by Excitech and its clients to reap benefits for all. Each team is able to develop the design data in the most effective way while collaborating with colleagues to take the project to manufacture and build with confidence in the co-ordinated design, reduced risk and so the expectation of reduced timescales to completion.

www.excitech.co.uk

Revit 7

Martyn Day

Just as we were going to press, Autodesk announced the release of Revit 7. Here we outline the new and enhanced features of Autodesk's innovative Building Information Modelling (BIM) system.

Product: Revit 7 **Supplier:** Autodesk **Price:** £POA

While most of Autodesk's products are settling down to a yearly release, Revit is still maintaining a '2x' velocity of development, producing two major releases a year. It only seems like yesterday I was reviewing Revit 6 and now here comes Revit 7! The good news is that there's some major new functionality to the product and it certainly starts broadening the BIM concept, beyond the architectural design elements.

Revit's older brother, Architectural Desktop appears to have a yearly release now and despite 'the cool of the new', is still selling like hot cakes. This is mainly due to the fact that ADT is based on AutoCAD, works a bit like AutoCAD and is proficient in a 2D AutoCAD kind of way. Revit is still struggling to gain much headspace but it is beginning to get used on some major, major designs. The detail design for David Child's Freedom Tower, which fits into Daniel Libeskind's World Trade Centre master plan, is currently leading the Revit charge. Skidmore, Owings & Merrill (SOM, of which David Childs is a consulting Partner) has seen its use of Revit on the project grow from just a pilot for the underground 'what if?' work, to being the critical design tool for the whole building. This stress testing is proving critical in feeding back into the development of the product, while SOM is claiming major cost savings in the process.



David Child's 'Freedom Tower' – the detail design of which is being carried out in Revit.

So, on to the content of Revit 7. As, one would expect, it's the usual mix of brand new features and enhancements to existing features. However, this release also features something that I was told would not appear in Revit – an Application Programming Interface (API), a key to allow third parties to add features and functions to Autodesk's own. Having good APIs and lots of third party developers was one of the key reasons given to the success of AutoCAD, it seems that with Revit 7 comes the admission that Autodesk can't do everything it wants in the time that is needed. The first batch of developers have been recruited and these address the structural side of things, which is apt as this is our structural issue!

Structural Design – Revit could always display structural members but these were mere dumb' positionals'. The new release comes with joist systems, beam setback controls, brace controls and column-grid capability. The beam data is held within the Revit structural model, allowing external applications to access the structural information for analysis. To do this, Autodesk has implemented the first stage of an API (Application Programming Interface), a concept always appeared to be shunned by the Revit developers. This is an admission that Autodesk realises that it can't do all the development it needs to do and so will work with specialist partners.

It's kind of weird but ADT has ABS (Autodesk Building Services for HVAC etc.) but has no structural, Revit has no building services but it has structural. At some point one of these applications is going to have to do all aspects of the 'single' model'!

Concept Modelling Tools – One of the key new features of Revit 7, is the conceptual modelling tools, called Building Maker. This capability allows architects to mass model in a fluid manner and maps these conceptual elements to building model elements, walls can be created from any vertical face, curtain walls ca be generated from any massing face, rooves can be created from sloping or horizontal faces and floors can be generated from floor area faces. The conceptual model is linked to the Revit model and remain associated and can be updated as the conceptual model changes.

Stacked Walls – It's now possible to create walls where there are changes in thickness, at different heights. These sub walls can also be scheduled for quantity take-offs.



Sub Region tools – These are new sketch defined areas hosted on toposurfaces. They can be moved and edited, have names, materials and areas and appear in toposurface schedules.

Nudge Tool – Placement of elements is critical in any modelling system and Revit 7 now enables the arrow keys to move elements by 1 snap unit – if you hold the shit key at the same time, it will move 10 times the current snap unit.

Revision Tables – Revit 7 supports revision numbering by project or by sheet. Revision clouds, which can be tagged, displaying a revision number, which can be added to a new global Revision Table, listing all revisions in the current project. New revisions can be created or merged with existing ones.

Viz Support – There's a new plug-in to allow Revit models to be easily imported in to Autodesk Viz 2005, complete with the Revit materials to create great rendered images. This is great news, especially as the AccuRender component in Revit, is starting to show its age.

Presentation Views – Building on the presentation theme, Revit can now easily create presentation graphics without using a rendering engine: 2D and 3D vectoral shadows, within OpenGl views, silhouette edges, sectional perspectives and linework support in perspective views.

3D ACIS Solid Support – While this may seem an odd addition, Revit now has the ability to bring in ACIS 3D solid data (this may be Autodesk's interpretation of ACIS created by their ShapeManager variant, as opposed to true ACIS solids). It means that elements like Mechanical parts (boilers etc.) can be brought into and displayed within Revit models.

Conclusion

These are the new capabilities and is really just 'the tip of the iceberg' in terms of work done on Revit 7, there are many, many updates to the features and capabilities. While in the past much of what has been added to Revit has appeared to cater to the niche wishes of the few hundred customers, Revit 7 appears to make in-roads to completeling on the Single model approach to architectural design. The structural elements and API are probably the two additions that will grow the product the most.

www.autodesk.co.uk

Haven't found what you're looking for?

Images communicate your design beliefs to the outside world. Brochures, lectures and presentations to clients are the platforms you use to promote your ideas and win new business. That's why managing digital assets has never been more important, says Daniel Emmerson.



Few businesses rely as heavily on images as architectural practices. Architectural projects can live or die on the quality of presentational material so it is no surprise that architects are heavy users of PowerPoint, Photoshop and other graphic solutions. But the recent explosion in the use of digital imagery has created searching inefficiencies and duplication problems that can make locating the right image in the right format a logistical nightmare.

Hidden assets

Picture the scene: you're the principal architect at a major international partnership. You've got a crucial tender bid in the morning, and you're working late preparing a visual presentation. You'd like to use some images from your company brochure but the graphic designers have all gone home and you don't know where the low-resolution versions are. You can only find the unwieldy hi-res images, which you decide to put in your PowerPoint anyway and then experience all the problems associated with having images that are too large inside an application. Your computer refuses to print it and you daren't email it to anyone.

Alternatively, you work in the marketing department of a practice that has just bid successfully on a high profile new football stadium and you have the media chasing you for images. You know there are a variety of images from numerous site visits, not to mention the beautiful, photo-real visualisations that went some way towards winning the project in the first place: perfect for that before and after magazine feature but you don't know what the image files are called, or which ones the directors want you to use. And the magazine is about to go to press.

Maybe you're the IT manager whose task it is to ensure that digital images are managed properly. The images form a hefty proportion of what is being stored on your servers but no matter how many directives you issue you don't seem to be able to stop the marketing team or the project architects from renaming image files or creating their own mini image databases on the network.

Images help you deliver your projects on time, on budget and to the highest standard but these images get lost, misplaced or duplicated over and over again. Managing them effectively saves not just time but money, as it enables employees to spend less time locating images and more time working on current projects. It also brings peace of mind as you can rest assured that you're always looking at the best images of a given project. Re-purposing is another key issue. Most images could and should be used in different ways throughout the practice but this can only happen if people know what exists and where to find it. We believe digital asset management is the answer.

Order of the day

In essence digital asset management is a return to the days of managing your images in a slide drawer. Before architects started storing digital images on servers they had two image management tools: the slide drawer and a briefcase. The slide drawer was the place they went to find images. They would flick through the drawer, select the slides that were needed and then put them inside a briefcase before leaving the practice to go and give a lecture or presentation.

A digital asset management solution like OpenAsset emulates that process. The way in which you search for images – the slide drawer – is the database, which is organised by keywords, project codes, copyrights, photographers and captions. And the digital era equivalent of the briefcase is the application: the place you put the images or how you use them.

> **Digital asset management essentially means that the architects have more time to get on with the more important task of creating amazing buildings**

What we tend to find when talking to architects or directors is that they are heavily dependent on someone else in the business knowing where the images are or how they should be used. They don't have any tools that allow them to search for the images they want, organise them by project code or keyword and make them available to the people that need them: the graphics team or the marketing department or whoever is ultimately responsible for creating the PowerPoint or brochure once the images have been chosen.

However, with the advent of solutions like OpenAsset it is incredibly easy to search, organise and publish images. The system assumes the responsibility for managing images and other digital assets associated with architectural projects and tenders. Images are searched for via a standard web browser interface and can be collected for output and automatically converted to the appropriate size and format for use in various applications as and when they are needed. Wasteful replication is thus avoided: the high res master is stored only once on the server.

Managing your digital assets effectively will enable the marketing team, the people responsible for publishing the images, quickly to find the images that the director has selected for publication, burn them on to a CD or download them as a ZIP file and send them to the journalist. The issue of duplication – a major headache for IT managers – can also be addressed. With OpenAsset, for example, all the images are stored onsite on a central server and it is impossible to check the same image into the system more than once. Access privileges determine who can view the images and the problem of people creating their own image libraries on their desktops is solved by a facility which allows the creation of user-specific albums where individual users can organise and save the images they need.

Digital asset management takes the strain by storing images and digital files into easy to access categories, chosen by you and your team, and providing improved organisation, cataloguing and management of your digital assets. Essentially this means that your marketing team can get on with promoting your work, the IT manager is absolved of his librarian duties and the architects have more time to get on with the more important task of creating amazing buildings.

Daniel Emmerson is business development director of Axomic.

www.axomic.com

PC Workstations: Memory

Can't tell your Rambus from your DDR2? In the latest instalment of his series of articles on workstation components, Robert Jamieson gives the low down on workstation RAM (Random Access Memory).

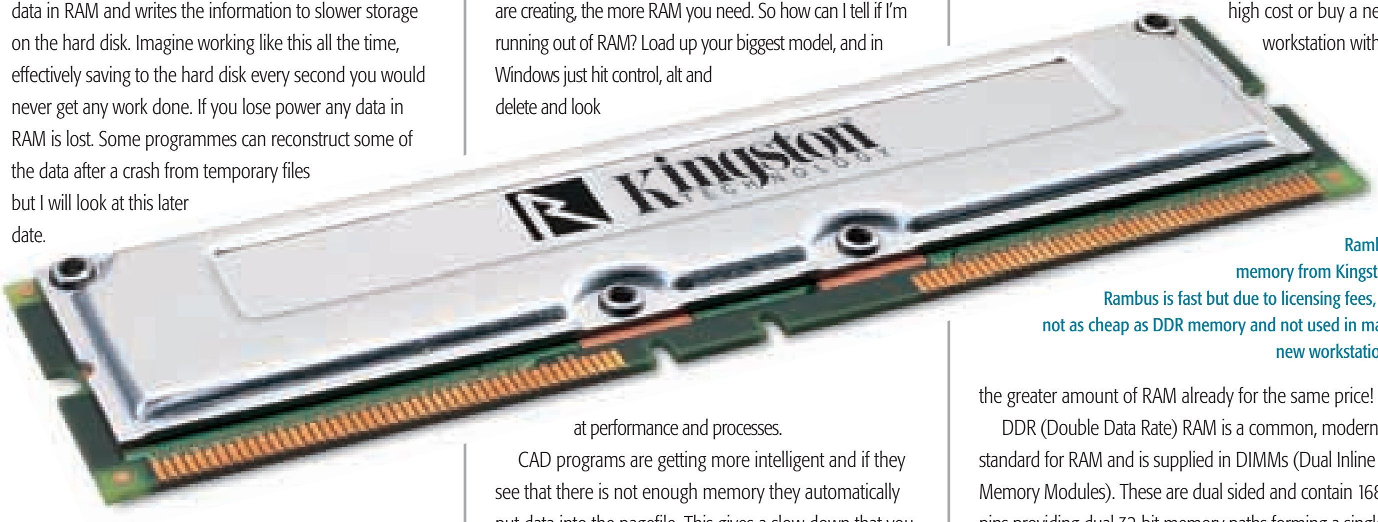
Robert Jamieson



When I first looked at what I wanted to cover with storage I thought I could do it in one article but as I researched my notes and the questions I've received on the subject it's become two parts just on memory!

Memory is a generic term for storage, and in the scope of this article I will specifically look at system memory or RAM (Random Access Memory). However, before I look at the technology behind RAM I will explain what it does in most computers. When you load a program (or even turn it on) the computer gets information from slower storage (a hard disk in most cases) and places the executable part into RAM. The reason it does this is speed – RAM is 10 times faster at moving data around. If the CPU was modifying something, say adding lines you have just drawn to a dataset, it can do this quickly and move on.

The data is only there while the power is supplied to the RAM. This is the reason you save files, takes the current data in RAM and writes the information to slower storage on the hard disk. Imagine working like this all the time, effectively saving to the hard disk every second you would never get any work done. If you lose power any data in RAM is lost. Some programmes can reconstruct some of the data after a crash from temporary files but I will look at this later date.



Rambus memory from Kingston: Rambus is fast but due to licensing fees, it's not as cheap as DDR memory and not used in many new workstations.

My computer is slow!

One of the common questions I get asked is "why is my program (CAD or other) running slow but the computer is a fast one? This commonly happens when you run out of RAM and the computer uses the hard disk for storage. Windows automatically sets a section of the hard disk as a reserve bit of RAM called the pagefile or swap in Unix. Remember that the hard disk is 10 times slower than RAM, which accounts for the performance reduction when you run out of system RAM. You can set up a pagefile in a certain way to lessen the performance hit but I will cover this in the hard disk section. The same principle is repeated on Unix and I remember the trepidation I had working out the size and location of my swap space on my first RS6000 server 16 years ago. Why are they called pagefile and swap? Information that is stored in memory is stored in "pages" and are "swapped" in and out as needed.

Why can't programs be re-written to use less RAM? I could write many pages on some of the reasons but this isn't likely to happen in the near future. In the meantime what I can try and explain is how they work and how you can get the best out of what you have or improve it. For example after loading up your operating system, your mail program, your Web browser and CAD application, your system might start to crawl as you load up your CAD file and get down to work. You have loaded all the other programs first and computer programs aren't bright enough to know what's important to you to run in RAM. An Operating System takes say 100Mb, your mail program 50Mb (with antivirus), Web pages are 10Mb apiece, then your main application is say 80Mb. Then the large data files load and the virus protection kicks in taking more RAM. You can see that 256Mb of RAM is just not enough as you are effectively working off the hard disk page file. There are a lot of other things taking RAM as well and the larger the models you are creating, the more RAM you need. So how can I tell if I'm running out of RAM? Load up your biggest model, and in Windows just hit control, alt and delete and look at performance and processes.

CAD programs are getting more intelligent and if they see that there is not enough memory they automatically put data into the pagefile. This gives a slow down that you might no realise is due to lack of System RAM. Then, if you run out of pagefile the program crashes. This can also happen with pagefile free as well due to lack of allocated handles (header records to where stuff is) resulting in the classic "HEAP" errors. I will look at fixes later.

Physical types of RAM

So physically what is RAM? In short I will say fast volatile storage. When the power goes off, what was stored is lost. There are three basic standards still in use in workstations and these all vary with form factor and speed.

Rambus or RDRAM, supplied in RIMMs, is a standard developed by Rambus Inc. and was pushed by Intel as the launch partner for the first range of Pentium 4s and Xeons. It comes in two flavours – 16-bit which needs to be used in matched pairs, or 32-bit, which can be used singularly and are not interchangeable. Speeds available are 600Mhz (rare), 800MHz and 1066Mhz, Each module comes either ECC or Non-ECC. But what is ECC I hear you ask?

ECC is error checking regarded as parity, which is a check to see if any errors are made. I've never seen any difference in "modern computers" and if it finds an error it's crashed the program anyway! Rambus is fast but due to licensing fees, it's not as cheap as DDR memory and not used in many new workstations. The reason I mention it is that it's often in existing workstations and there is often a choice as to whether to add more RDRAM at a high cost or buy a new workstation with the greater amount of RAM already for the same price!

DDR (Double Data Rate) RAM is a common, modern standard for RAM and is supplied in DIMMs (Dual Inline Memory Modules). These are dual sided and contain 168 pins providing dual 32-bit memory paths forming a single 64-bit memory path. Most motherboards want this supplied in matched pairs to get maximum performance! PC1600 is 133MHz RAM double data rated to 266MHz giving 1.6Gb/second throughput of data. PC2100 DDR is memory running at 166MHz double data rated to 333MHz provides 2.1Gb/second throughput of data. The top "standard" DDR runs at 400MHz and is used in Intel P4c and above.

Registered DDR memory differs from un-buffered DDR memory in that motherboards which support un-buffered memory are targeted for the consumer market and support up to 2Gb of overall memory, while motherboards which support registered DIMMs are targeted for the workstation market are capable of supporting up to 4Gb of DDR memory. That said I've used un-buffered in a 4Gb workstation with no trouble, but be careful picking the right RAM!

DDR2 is the new standard and starts at 400MHz called

»

DDR400 it can run 533Mhz and which doesn't have to be the same FSB (Front Sided bus) as the CPU. It's all in the pre-fetch (don't ask!) that forms the standard for future speed improvements. It always needs to be fitted in pairs and is not backward compatible with DDR1. Some motherboards support DDR1 and DDR2 (not at the same time) but it's in the specialist "overclockers market" and quality for CAD may be an issue. DDR2 also appears on new graphics cards as GDDR3 on the top end PCI Express FireGL V7100 from ATI.

Each memory type has a cut out slot. This is to identify if it's ECC, DRR1 or DDR2. Never force a memory chip against this or you will have a broken motherboard.

So you've decided to upgrade your RAM. Is there cheap ways to do this? There are several strategies that can save you money with the same quality, and here are some basics tips on buying memory.

Buying tips

How much RAM will I need for my application? Not an easy one as there are so many factors. As a general statement based on the fact that RAM is quite cheap today, start with at least 1Gb for CAD. Under Windows XP the maximum an application can use is 2Gb but there is a way to increase this to 3Gb (not all applications support this) which is covered later in this article.

As most workstations have four memory slots (if there's less than four, don't buy it) start by putting 2x 512Mb modules in and keep two free for future upgrades. Matching RAM chips can be hard. I visited a customer with 1x512Mb, 1x256Mb, 1x128Mb and a 64Mb. The workstation supported memory in pairs and with the different form factors I'm surprised it worked, but it was slower than it should have been. What do I mean by form factors? Well you can get physical memory in different type of chips, so a 256Mb DIMM might have two "chips" on it while a different range from the same manufacturer might have eight and still be a 256Mb DIMM. These are all wired differently and remember timing is measured in Nano seconds. Get it mixed up and you will see a lot of blue screens.

So if you have two workstations to upgrade to 2Gb (currently with 2x 512Mb and 2 free slots) I would put the entire old RAM into one workstation and the new 4 x 512Mb into the second workstation. This way you can be sure you've matched all your RAM.

Is this high performance RAM worth buying? I mean the CAS2 low latency which takes less clock cycles to access. This type of RAM might give you advantages for overclocking your system (running faster than spec) but makes such a small difference in a standard system. The money is better spent in other areas. I recommend buying a quality brand or whatever your provider supports to keep your warrantee.

> Under Windows XP the maximum an application can use is 2Gb but there is a way to increase this to 3Gb

Cache

Cache is very fast RAM and today it is built into the processor to shorten the electrical distance. Cache is design to store recently accessed data and supply it faster than going to the main memory. The cache principle is used on hard disks by having RAM on the drive to supply data faster than doing to the disks themselves. Different processors have larger or smaller Caches. Celerons generally have very small caches to limit the performance and therefore limit the performance for the budget end. Once you get a "full" processor (P4 etc) the cache is larger. You need this as CAD uses memory i.e. by swapping a lot. The Xeons or specialist chips offer more cache but the benefits are often very slim even for CAD and they cost lots of money.

FSB and Quad Pumped

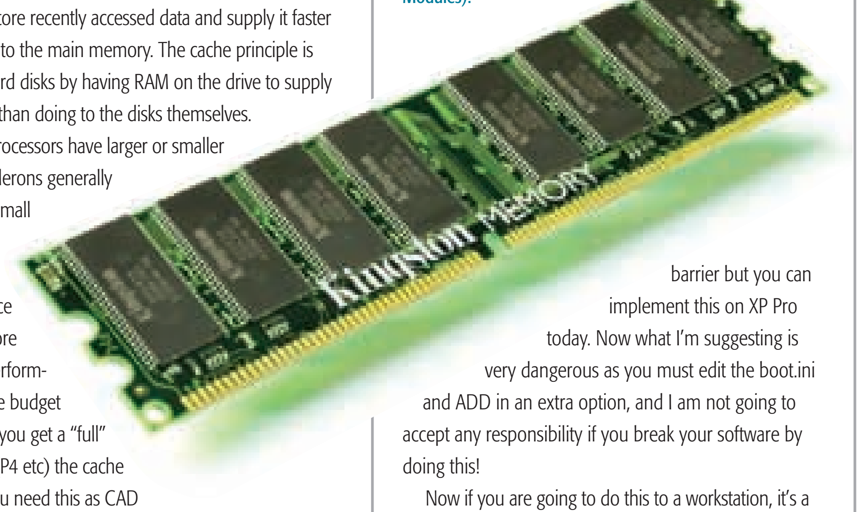
The Intel Pentium 4 Prescott clock speed is based on its Front Side Bus (FSB), which currently is clocked at 200MHz and runs at four data transfers per clock cycle (quad-pumped or quad data rate), which is where the marketing-friendly term FSB800 came from. An older 133MHz DDR Ram chip is quad pumped to 533 MHz. The new DDR2 (note the 2) is running the DDR2 533Mhz RAM at twice the speed so it's 1066 MHz i.e. faster than FSB 800, so don't get caught out.

AMD and Opteron

For its new Opteron chip AMD has put the controller inside the CPU and not in the Northbridge on the motherboard. Industry pundits have given them a performance advantage of up to a year. If you look at MCAD's workstation supplement in October it demonstrates this performance lead and does not take into consideration the 64-bit advantage. The problem is that they have yet to get customer acceptance, and therefore a large user base, before Intel comes back with a solution. It will be interesting to see if Intel can pull something out of the hat quickly. The other issue with Opteron is that you need to redesign the CPU to support faster memory, but the current speed advantage easily out ways this slight disadvantage.

Breaking the 2Gb per process limit

Some of the CAD applications have enabled the ability to "see" more than 2Gb of RAM (Autodesk Inventor, SolidWorks etc.). This will be useful when 64-bit Windows ships next year which does away with the 2Gb barrier but you can implement this on XP Pro today. Now what I'm suggesting is very dangerous as you must edit the boot.ini and ADD in an extra option, and I am not going to accept any responsibility if you break your software by doing this!



DDR400 from Kingston: DDR (Double Data Rate) RAM is a common, modern standard for RAM and is supplied in DIMMs (Dual Inline Memory Modules).

Now if you are going to do this to a workstation, it's a good idea to do it to one with more than 2Gb of RAM (4Gb for example), but there are still benefits to be gained from systems with only 2Gb. i.e. fewer program crashes with large models. Windows task manager is not always telling you the truth as often applications crash when you get to 1.4Gb to 1.7Gb of memory as other "hidden" drivers and programs are using this RAM.

How to do it

Edit the BOOT.INI you can get to it via the Control Panel, System, Advanced, Startup and Recovery, Edit System Startup options by copying the line multi(0)disk(0)rdisk(0)partition(1)\WINDOWS="Microsoft Windows XP Professional" /Fastdetect and paste it below. Edit this new line to add /3GB in the parenthesis so you know which one to select and add /3GB /USERVA=2700 at the end of the line. Save and restart your system and when it boots you will have an extra option to select the /3GB option. The userva switch limits the max to 2.7Gb per application and is generally a little more reliable. If it all goes wrong and your system doesn't boot you can boot off the Windows XP CD and go to the console and use bootcfg to create a new boot.ini file. I speak from experience! Not every system will work with this as some software and drivers are not /3GB aware so it's best experimented with an off line workstation. I have seen large CAD models using up to 2.4Gb and 3dsmax render massive architectural scenes, which have crashed before so I know it works, just be careful!

Next month I will be looking at storage in the form of hard disks and the best way to use them.

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6 ❑ None of these
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2 ❑ 3D Modelling
3 ❑ Management

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❑ MicroStation
❑ Others: (please specify)

....

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